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SCIENCE & TECHNOLOGY

USSR; LIFE SCIENCES

CONTENTS

AGRICULTURAL SCIENCE

- Inducing Resistance to Tobacco Mosaic and Type X Potato Virus in Plants by Double-Stranded RNA Isolated From *Saccharomyces* Yeast
(G.B. Bistritskayte, Z.B. Stasyavichyus; TRUDY AKADEMII NAUK LITOVSKOY SSR, SERIYA V BIOLOGICHESKIYE NAUKI, No 4, Oct-Dec 86) 1
- Mechanisms of Chemical Immunization of Rye Against Rust Infection
(E.P. Komarova, V.P. Matyushevskaya; DOKLADY AKADEMII NAUK BSSR, No 10, Oct 86) 9
- Bioecologic Characteristics of Development of Wheat Mildew in Central Asia
(L.N. Guz; UZBEKSKIY BIOLOGICHESKIY ZHURNAL, No 6, Nov-Dec 86) 14
- Synthesis of Hexaploid Polonicum-like Wintering Wheat *Triticum Aestivum* L. Subsp. *Hexapolonicum* Avan
(S.Kh. Galstyan-Avaneysan; BIOLOGICHESKIY ZHURNAL ARMENII, No 11, Nov 86) 14
- Use of Gibberellic Acid in Agriculture
(N.P. Beglyaran; BIOLOGICHESKIY ZHURNAL ARMENII, No 10, Oct 86) 15

Genetic Principles for Creation of Triticale (XTriticale). Part 4. Embryo Culture Method in Creation of Primary Hexaploid Triticale (I.A. Gordey, L.F. Khodortsova; GENETIKA, No 1, Jan 86)	15
Genetic Analysis of Resistance of Soft Wheat Specimens (Triticum Aestivum L.) to Powdery Mildew (T.V. Lebedeva; GENETIKA, No 9, Sep 86)	16
Study of Monosomal Lines of Spring Common Wheat Varieties Saratovskaya 29 and Diamant 1 Under Various Vegetation Conditions, Based on Quantitative Characteristics. Part 1. Number of Spikelets and Grains on Main Ear (V.S. Arbuzova; O.I. Maystrenko; GENETIKA, No 9, Sep 86)	16
Breeding of Winter Wheat for Resistance to Fusarium Root Rot (F.G. Kirichenko, L.T. Babayants, et al.; SELSKOKHOZYAYSTVENNAYA BIOLOGIYA, No 8, Aug 86)	17
Corn Resistance to Smut Infections (I.A. Fedko, A.A. Morshchatskiy, et al.; SELSKOKHOZYAYSTVENNAYA BIOLOGIYA, No 8, Aug 86)	18
Physiological and Biochemical Characteristics of Various Pathogenic Strains of Erwinia Phytophthora (A.M. Lazarev, I.I. Chernyayeva; SELSKOKHOZYAYSTVENNAYA BIOLOGIYA, No 8, Aug 86)	18
Harmfulness of New Generations of Bugs and Larvae of Pentatomid Eurygaster (Eurygaster Integriceps Put.) on Wheat (M.A. Volodichev; SELSKOKHOZYAYSTVENNAYA BIOLOGIYA, No 8, Aug 86)	19
Chloroplast Activity in Various Donor-Acceptor Relationships in Wheat Genotypes (E.G. Kazibekova, D.A. Aliyev; IZVESTIYA AKADEMII NAUK AZERBAYDZHANSKOY SSR, SERIYA BIOLOGICHESKIKH NAUK, No 3, May-Jun 86)	19
Inheritance of Plant Height and Productivity in Hard Wheat Hybrids (I.D. Mustafayev, A.A. Aleksanyan; IZVESTIYA AKADMII NAUK AZERBAYDZHANSKOY SSR, SERIYA BIOLOGICHESKIKH NAUK, No 3, May-Jun 86)	20

BIOCHEMISTRY

Interrelationship of Receptor Binding Sites for Bicyclic Phosphate and Phosphite Derivatives, Picrotoxin and (³ H)-GABA (G.Ya. Pervukhin, A.A. Maslov, et al.; DOKLADY AKADEMII NAUK SSSR, No 3, Mar 87)	21
---	----

Fluoroimmunoassay: Porphyrin as Novel Label (A.P. Savitskiy, D.B. Papkovskiy, et al.; DOKLADY AKADEMII NAUK SSSR, No 3, Mar 87)	21
DNA-like Duplexes With Repetitions. Part 13. Chemical Enzymic Synthesis of Polymers Coding for Polypeptide (Phe-Asp) (O.N. ^P Koroleva, V.K. Potapov, et al.; MOLEKULYARNAYA BIOLOGIYA, No 2, Mar-Apr 86)	22
Biological Activity of Polar Lipid of Clostridium Butyricum Spores (G.P. Gayenko, V.I. Duda, et al.; MIKROBIOLOGIYA, No 5, Sep-Oct 86)	23
BIOPHYSICS	
Change of Cytochrome c Globule Compressibility During Redox Transition (D.P. Kharakoz, A.G. Mkhitarian; MOLEKULYARNAYA BIOLOGIYA, No 2, Mar-Apr 86)	24
Mechanism of Action of Membrane-Stabilizing Agent 1-(Chloromethyl)Silatrane (Yu.V. Pisarskiy, V.B. Kazimirovskaya, et al.; DOKLADY AKADEMII NAUK SSSR, No 3, Mar 87)	25
Ca ²⁺ Conductivity Channels Induced by Pseudocyclic Analogue DB18K6 on Bilayers and Impregnated Filters (U.Z. Mirkhodzhayev, Kh.F. Abdullayev, et al.; UZBEKSKIY BIOLOGICHESKIY ZHURNAL, No 6, Nov-Dec 86)	25
BIOTECHNOLOGY	
Problems and Prospects in Cellular Biotechnology of Plants (O.S. Melik-Sarkisov; BIOLOGICHESKIY ZHURNAL ARMENII, No 10, Oct 86)	26
Conditions Favoring Ascitic Tumor Formation in In Vivo Hybridoma Cultivation (A.S. Novokhatskiy, I.V. Malakhova, et al.; ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII, No 7, Jul 86)	26
Mechanism of Limitation of Growth of Escherichia Coli Recombinant Strain (Ye.L. Golovlev, Yu.G. Ivanitskaya, et al.; MIKROBIOLOGIYA, No 5, Sep-Oct 86)	27

ENVIRONMENT

Automated Environmental Radiation Monitoring System (V.G. Zarkh, I.A. Sobolev; GIGIYENA I SANITARIYA, No 5, May 86)	28
---	----

EPIDEMIOLOGY

Incidence of Major Cardiovascular Diseases in Rural Areas (T.N. Ardamatskaya, M.M. Oleynik, et al.; SOVETSKAYA MEDITSINA, No 10, Oct 86)	32
--	----

GENETICS

Medial-Genetic Study of Population of Kostroma Oblast. Part 3. Coefficient of Inbreeding and Its Dynamics in Rural Populations and Rayon-Scale Cities (G.M. Paradeyeva, L.P. Bolshakova, et al.; GENETIKA, No 9, Sep 86)	33
HFR Donors of Phototrophic Nitrogen-Fixing Bacterium Rhodopseudomonas Sphaeroides. Location of Mutations in Genes Controlling nitrogen Fixation (S.V. Kamenev, T.P. Polivtseva, et al.; GENETIKA, No 11, Nov 86)	33
New Method of Synthesis and Cloning of cDNA (A.Yu. Borovkov; GENETIKA, No 1, Jan 86)	34
Analysis of Nopaline-Type Ti Plasmid Mini-Replicon of Agrobacterium Tumefaciens C58 and Possibility of Its Use To Transfer Foreign Genes Into Plants (E.S. Piruzyan, V.M. Andrianov; GENETIKA, No 11, Nov 86)	35
Plasmids Determining Resistance to HgCl ₂ in Acinetobacter: Occurrence in Various Mercury Deposits (S.Z. Mindlin, Zh.M. Gorlenko; GENETIKA, No 11, Nov 86)	35
Characteristics of Derivatives of RP4 Plasmid With Broad Host Spectrum With Variable Properties of Maintenance and Heredity (P. Dobrovolski, V.A. Sakanyan; GENETIKA, No 11, Nov 86)	36
Nah Genes of Pseudomonas Putida: Molecular-Genetic Analysis of Plasmid pBS286 (R.V. Tsoy, I.A. Kosheleva, et al.; GENETIKA, No 11, Nov 86)	37

New Vector for Cloning Genes and Replicons in Yeasts (M.A. Neystat, M.Yu. Fonshteyn, et al.; GENETIKA, No 11, Nov 86)	37
Cytogenetic Effect of Cotoran and Toluine in Barley Cells (A.S. Sultanov, A.A. Abdullayev; UZBEKSKIY BIOLOGICHESKIY ZHURNAL, No 4, Jul-Aug 86)	38
Significance of Marriage Structure in Predicting Pregnancy Failure (L.V. Antipenskaya, T.A. Ilyukhina, et al.; GENETIKA, No 1, Jan 86)	38

HUMAN FACTORS

Stabilization and Control of Statistically Unstable Objects (A.V. Melnikov, A.P. Chernyshev; PSIKHOLOGICHESKIY ZHURNAL, No 5, Sep-Oct 86)	39
Additional Training in Engineering Psychology for Engineering and Technical Personnel (A.A. Krylov, M.N. Ilyina; PSIKHOLOGICHESKIY ZHURNAL, No 5, Sep-Oct 86)	39
Research Problems in Design and Implementation of Man-Machine Systems: Seminar Presentations at Moscow Higher Technical College imeni N.E. Bauman (V.V. Zelentsov; PSIKHOLOGICHESKIY ZHURNAL, No 5, Sep-Oct 86)	40
Psychological Aspects of Human Factor Activation (T.S. Kabachenko; PSIKHOLOGICHESKIY ZHURNAL, No 4, Jul-Aug 86)	40
Semiautomatic Control Systems for Manipulative Robots (L.V. Spiridonova; PSIKHOLOGICHESKIY ZHURNAL, No 1, Jan-Feb 87)	41
Autoophthalmotraining for Fatigue Prevention in Microscopists (L.P. Grimak, A.A. Israyelyan; PSIKHOLOGICHESKIY ZHURNAL, No 1, Jan-Feb 87)	41
Prediction of Individual Competence for Operation of Motor Vehicles (N.Ye. Popova; PSIKHOLOGICHESKIY ZHURNAL, No 4, Jul-Aug 86)	42
Training and Certification of Highly Qualified Cadres in Work Psychology and Engineering Psychology (A.P. Chernyshev; PSIKHOLOGICHESKIY ZHURNAL, No 3, May-Jun 86)	42

Robotics Research: Psychological and Rhythmic Aspects (A.K. Popov; PSIKHOLOGICHESKIY ZHURNAL, No 3, May-Jun 86)	43
---	----

Correlation Between Conceptual Model of Activity, Mnemic Scheme and Operator Training Method (A.I. Galaktionov, V.N. Yanushkin; PSIKHOLOGICHESKIY ZHURNAL, No 2, Mar-Apr 87)	43
---	----

IMMUNOLOGY

Evaluation of Nonspecific Immunostimulants by Leukocyte Migration Inhibition Test (M.N. Aptekareva, L.P. Sviridov; ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII, No 7, Jul 86)	44
--	----

Induction of Differentiation of Precursors of T-Cells of Human Blood and Bone Marrow by Synthetic Fragment of Thymic Factors (V.F. Martynov, L.I. Leontyeva, et al.; IMMUNOLOGIYA, No 4, Jul-Aug 86)	44
--	----

Influence of Bone Marrow Factor, Stimulator of Antibody Producers, on ³ H-Thymidine Incorporation Into Lymphocytes Stimulated by Phytohemagglutinin and Pokeweed Mitogen (E. Patsakova, A.M. Ivanushkin, et al.; IMMUNOLOGIYA, No 4, Jul-Aug 86)	45
---	----

Diagnosis Made by an Antigen (V. Ogurtsov; SOVETSKAYA ROSSIYA, 3 Apr 87)	46
---	----

MARINE MAMMALS

Oxygen Consumption by Baikal Seal in Free Swimming and Effects of Diving Duration (Ye.A. Baranov, Ye.A. Petrov, et al.; FIZIOLOGICHESKIY ZHURNAL SSR IMENI I.M. SECHENOVA, No 8, Aug 86)	47
---	----

MEDICINE

Cryoconservation of Granulocytes Using Leukocryodmac Solution (V.A. Agranenko, N.N. Abezgauz, et al.; GEMATOLOGIYA I TRANSFUZIOLOGIYA, No 12, Dec 86)	48
---	----

Rheological Properties of Blood and State of Microcirculation During Experimental Administration of Perfluoroorganic Compounds-Emulsions as Blood Substitutes (F.M. Gusenova, U.U. Akhsyanov, et al.; GEMATOLOGIYA I TRANSFUZIOLOGIYA, No 12, Dec 86)	48
---	----

Synthetic Methods To Prepare Complex Blood Substitutes Used in Shock Management (G.S. Levin; GEMATOLOGIYA I TRANSFUZIOLOGIYA, No 12, Dec 86)	49
Access to Heart Interior Without Scalpel (T. Chesanova; NEDELYA, No 14, 6-12 Apr 87)	50
Cardiac Disease and Remote Computer Monitoring (V. Martyanov; MOSKOVSKAYA PRAVDA, 14 Apr 87)	50
Heart Surgery in Armenia (G. Miansaryan; KOMMUNIST, 13 Jan 87)	51
Acquired Immune Deficiency Syndrome (A.I. Strukov, O.Ya. Kaufman; ARKHIV PATOLOGII, No 10, Oct 86)	51
Pharmorubicin Therapy in Breast Cancer (N.Ya. Ass, V.I. Borisov; SOVETSKAYA MEDITSINA, No 10, Oct 86)	52
Carcinoembryonic Antigen (CEA) in Cancer of Large Intestine (V.I. Knysh, V.V. Prorokov, et al.; SOVETSKAYA MEDITSINA, No 10, Oct 86)	52
Radioactive Elements by Reverse Alchemy (L.Levitskiy; IZVESTIYA, 25 Apr 87)	53
Hepatitis B Viral DNA in Human Reproductive Cells (A.K. Naumova, V.I. Korenev, et al.; GENETIKA, No 1, Jan 86)	53

MICROBIOLOGY

Immobilization of Microorganisms on Latex for Production of Artificial Floccs (R.M. Aliyeva, A.B. Manasbayeva, et al.; MIKROBIOLOGIYA, No 5, Sep-Oct 86)	54
Respiration of Cells and Cell-Free Extracts of Hydrogen Bacterium Alcaligenes Eutrophus (Ya.V. Fedorova; MIKROBIOLOGIYA, No 5, Sep-Oct 86)	54
Effect of Media pH on Growth and Physiology of Hydrogen Oxidizing Bacteria (T.G. Volova, G.M. Tereshkova, et al.; MIKROBIOLOGIYA, No 5, Sep-Oct 86)	55
Production of Hybrid Forms of Yeasts Hansenula and Pichia by Protoplast Fusion (M.A. Abramova, Yu.G. Kapultsevich; MIKROBIOLOGIYA, No 5, Sep-Oct 86)	56

Two-Cycle Cultivation of Cholera Vibrios in Fermenter (P.Kh. Nenkov, N. Strashimirova, et al.; ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII, No 7, Jul 86)	56
MILITARY MEDICINE	
Western Nile Fever (K.S. Ivanov, Yu.V. Lobzin, et al.; ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII, No 7, Jul 86)	57
MOLECULAR BIOLOGY	
Designing Intermediate Vectors for Transfer and Expression of Heterologous Genes in Higher Plants (A.Z. Muradov, Dzh.A. Aliyev; IZVESTIYA AKADEMII NAUK AZERBAYDZHANSKOY SSR. SERIYA BIOLOGICHESKIKH NAUK, No 3, May-Jun 86)	58
Nature of Heme-Nonapeptide Aggregation in Aqueous Solution (A.M. Arutyunyan, S.A. Surkov, et al.; MOLEKULYARNAYA BIOLOGIYA, No 2, Mar-Apr 86)	67
Detection of Heme-Heme Interaction in Circular Dichromism Spectra (A.M. Arutyunyan, A.N. Denisenko; MOLEKULYARNAYA BIOLOGIYA, No 2, Mar-Apr 86)	68
Structure of Thermus Thermophilus Ribosomes. Part 1. Method of Isolation and Purification of Ribosomes (Z.V. Gogiya, M.M. Yusupov, et al.; MOLEKULYARNAYA BIOLOGIYA, No 2, Mar-Apr 86)	68
PHARMACOLOGY TOXICOLOGY	
Transport and Metabolism of Membrane-Active Chelating Agent in Mice (Ye.K. Plotnikova, N.Ya. Golovenko, et al.; VOPROSY MEDITSINSKOY KHIMII, No 1, Jan-Feb 87)	69
PHYSIOLOGY	
Depth Perception and Structure of Stereoanalyzer (G.G. Vaytkyavichyus, V.K. Mildazhis, et al.; PSIKHOLOGICHESKIY ZHURNAL, No 4, Jul-Aug 86)	75
Effects of Angiotensin-II and cAMP on Correlation of Intravital Redox Dynamics With Electrical Activity of Neurons (V.V. Sherstnev, M.O. Samoylov, et al.; FIZIOLOGICHESKIY ZHURNAL SSR IMENI I.M. SECHENOV, No 10, Oct 86)	75

Effects of Hyperoxia on Hemoglobin of Laboratory (L.I. Irzhak, V.I. Tayurskiy; FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOV, No 10, Oct 86)	76
Effects of High Temperatures on Humans (A.A. Dzhaylobayev, K.A. Arbayeva, et al.; ZDRAVOOKHRANENIYE KIRGIZII, No 3, May-Jun 86)	76
Morphological and Functional Characteristics of Embryonal Neural Grafts in Adult Rat Brain (V.V. Senatorov, G.P. Obukhova; FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA, No 8, Aug 86)	77
Peptide Modulation of Spontaneous and Induced Catecholamine Release From Inferior Mesenteric Ganglion in Dog (V.M. Reprintseva, V.P. Martinovich, et al.; FIZIOLOGICHESKIY ZHURNAL SSR IMENI I.M. SECHENOVA, No 8, Aug 86)	78
Stimulation of DNA Synthesis in Cerebrocortical Cells of Intact and Posthypoxic Recipient Rats Following Embryonal Neural Grafting (L.V. Polezhayev, M.A. Aleksandrova, et al.; DOKLADY AKADEMII NAUK SSSR, No 3, Mar 87)	78
Ultrastructure of Embryonal Neural Graft in Brain Sites of Posthypoxic Recipient Rats (L.V. Cherkasova, R.F. Davletchina; DOKLADY AKADEMII NAUK SSSR, No 3, Mar 87)	79
Electrophysiological Study of Reticulo-Limbic Inter- relationships Upon Exposure to Long-Term Vibration (S.M. Minasyan, O.G. Baklavadzhyan; FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA, No 1, Jan 87)	79
Bombesin Lowers Body Temperature Primarily by Increasing Peripheral Blood Flow (A.T. Maryanovich, Ye.V. Kudryavtseva, et al.; FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA, No 1, Jan 87)	80
Changes in Blood Coagulating Activity During Acute Hypoxic Hypoxia (G.D. Pak, V.S. Sverchkova, et al.; FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA, No 1, Jan 87)	81

PUBLIC HEALTH

Vaccine and Infant Diseases (V. Nikolayev; MOSKOVSKAYA PRAVDA, 7 Apr 87)	82
---	----

PSYCHOLOGY

- Human TV Image: Psychosemantic Studies
(V.F. Petrenko, Ye.Ye. Pronina; PSIKHOLOGICHESKIY
ZHURNAL, No 3, May-Jun 86) 83

RADIATION BIOLOGY

- Modeling of Rat Lymphocytes Reaction to Irradiation
(A.A. Ogandzhanyan; BIOLOGICHESKIY ZHURNAL ARMENII,
No 11, Nov 86) 84
- Nuclear War in Mountainous Areas
(S.B. Daniyarov, P.N. Goldberg; ZDRAVOOKHRANENIYE KIRGIZII,
No 3, May-Jun 86) 84

CONFERENCES

- All-Union Conference on Industrial Cultivation of Microalgae
(A. Rakhimov; UZBEKSKIY BIOLOGICHESKIY ZHURNAL, No 4,
Jul-Aug 86) 86

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INDUCING RESISTANCE TO TOBACCO MOSAIC AND TYPE X POTATO VIRUS IN PLANTS BY DOUBLE-STRANDED RNA ISOLATED FROM SACCHAROMYCES YEAST

Vilnius TRUDY AKADEMII NAUK LITOVSKOY SSR, SERIYA V, BIOLOGICHESKIYE NAUKI in Russian No 4, Oct-Dec 86 (manuscript received 24 Jul 85) pp 3-8

[Article by G.B. Bistritskayte and Z.B. Stasyavichyus from the Botany Institute of the Lithuanian SSR Academy of Sciences]

[Text] 1. Introduction. It is well known from data in the literature [1-3] that a number of substances, heterologic nucleic acids and synthetic polyribonucleotides--poly(I)-poly(C) and poly(H)-poly(C), polyacrylic acid, cycloheximide, etc.--are capable of inducing the formation of interferon in the organism and in an animal tissue culture and of endowing cells with nonreceptivity to viral infections. The effect of interferon and its inducers has mainly been studied on animal tissues. The effect of interferon inducers on plant viruses has not been studied sufficiently.

The capability of polyribonucleic complexes--poly(I)-poly(C) and poly(H)-poly(C)--to induce virus resistance in tobacco and datura plants has been established [4, 5]. It has also been shown that, when injected into leaves of ultrasensitive kidney beans and tobacco, nucleic RNA and cycloheximide inhibit the infectiousness of tobacco mosaic virus [TMV] and induce the formation of an antiviral protein [6, 7]. Antiviral protein that has been isolated from tobacco leaves in the presence of viral infection or after the injection of interferonogens into leaves possesses a number of properties that are common with those of animal interferon [8-10].

This article is intended to study the inhibiting effect of nucleic double-stranded RNAs as interferon inducers on plant viruses.

2. Materials and Methods.

Preparations of double-stranded RNA isolated from a mutant strain, SN 2-n3UV2, of *Saccharomyces* according to a previously described method [11]. These preparations contained two types of double-stranded RNA of differing molecular weight.

Preparations of TMV and type X potato virus [XPV] that were purified by the method of differential centrifugation were used in the experiments. *Nicotiana*

tabacum L. of the variety Samsun were used as accumulator plants for the TMV viruses, and *Nicotiana debneyi* Domin was used as an accumulator plant for the XPV virus.

TMV preparations diluted to $c = 0.05$ and XPV preparations diluted to $c = 2.6$ mcg/ml were used in all versions of the experiment to obtain the calculated single-necrosis infections and attain a linear relation between the concentration (c) of inoculum and number of necroses on the leaves of the indicator plants. At $c = 0.05$ mcg/ml TMV yields an average of 100 necroses per half leaf of hybrid tobacco, and at $c = 2.6$ mcg/ml XPV yielded up to 40 necroses per leaf of *Gomphrena*.

Nicotiana glutinosa L. and hybrid tobacco (*N. tabacum* x *N. glutinosa*), which were selected by M.F. Ternovskiy, were used as host plants for the TMV infection with a local necrotic reaction, and the tobacco variety Samsun was used for a plant having a systemic reaction. *Gomphrena* (*Gomphrena globosa* L.) and *datura* (*Datura stramonium* L.) were used for the XPV infection. During the experiments the plants were cultivated and kept in a greenhouse whose temperature fluctuated between 20 and 35 degrees C. The experiments were conducted in three series using 8 to 10 leaves each in each series.

The infectiousness of TMV and XPV in the presence of double-stranded RNA was determined by biologic titration of virus preparations that were mixed with preparations of double-stranded RNA on leaves of indicator plants corresponding to the inoculation of the virus being tested by a local necrotic reaction.

To determine the degree of double-stranded RNA-induced resistance to TMV and XPV in ultrasensitive plants, the leaves of indicator plants were treated with preparations of double-stranded RNA (in a concentration ranging from 880 to 0.88 mcg/ml) dissolved in 0.1 x SSC buffer (1 x SSC buffer, 0.15 M sodium chloride and 0.015 M sodium citrate [pH = 7]), and they were inoculated with virus at different time intervals from the time of treatment. Plant leaves that were pretreated with 0.1 x SSC buffer and inoculated with virus at specified time intervals served as a control.

The plant leaves were treated with double-stranded RNA preparations and inoculated with virus by the method of using a glass spatula to rub them into leaves that had been prepowdered with fine-grained carborundum. On days 5 through 7 after the plants were inoculated with virus the number and dimensions of the local necrotic injuries were counted. The percent inhibition of the virus' infectiousness by the double-stranded RNA was computed on the basis of the number of necroses formed on the experimental and control leaves.

The degree to which systemic resistance to TMV developed in tobacco and to XPV in *datura* as a result of the double-stranded RNA was determined by comparing the rate at which the virus accumulated in the experimental and control leaves of the system host. For this the third and fourth leaves of young Samsun tobacco and *datura* (in phase 4 through 5 of the latter leaves) were treated with preparations of double-stranded RNA, and those of the control were treated with 0.1 x SSC buffer. After 1 to 3 days all were infected with TMV

and XPV respectively. After 10 to 12 days the concentration of virus in the sap of the upper fifth and sixth leaves was measured by dilution and biologic titration.

The experimental data obtained were treated by variation statistics by determining the mean values and significance of the difference between the numbers based on Student's criteria [12].

3. Results and Their Discussion.

To study the indirect effect of double-stranded RNA on the infectiousness of TMV and XPV in in vitro experiments, virus preparations were maintained in a mixture with preparations of double-stranded RNA ($c = 80$ mcg/ml) for 2, 24, and 72 hours at 10 degrees C. Next, the hybrid tobacco and Gomphrena leaves were respectively inoculated.

Calculation of the number of necrotic infections on the inoculated leaves showed that at $c = 80$ mcg/ml, which is sufficient for induction of local resistance in plants, the preparations of double-stranded RNA did not significantly reduce the infectiousness of TMV (Table 1). Thus in the course of between 2 and 72 hours, the infectiousness of TMV was only inhibited 14 to 17.7 percent.

Table 1. Effect of Double-Stranded RNA on TMV Infectiousness in In Vitro Experiments

Duration of Maintaining Viruses in Mixture of Double-Stranded RNA Preparations, h	Mean No. of Necroses per Half Leaf of Hybrid Tobacco Plants		Inhibition of Infectiousness of Virus, %
	Experimental	Control	
2	111 ± 2.6	129 ± 4.4	14.0
24	16 ± 1.1	19 ± 2.2	15.8
72	14 ± 1.0	17 ± 2.0	17.7

$P < .02$

In the version with XPV, double-stranded RNA significantly inhibited the virus' infectiousness (Table 2). In the course of from 2 to 72 hours, the virus' infectiousness was inhibited 33.4 to 62.7 percent.

Table 2. Effect of Double-Stranded RNA on XPV Infectiousness in In Vitro Experiments

Duration of Maintaining Viruses in Mixture of	Mean No. of Necroses per Half Leaf of Gomphrena		Inhibition of Infectiousness of Virus, %

Double-Stranded RNA Plants
Preparations, h

2	26 \pm 5.0	33.4
24	14 \pm 5.2	64.2
72	15 \pm 5.8	62.7
Control	39 \pm 6.1	--

P < .02

When the degree of induction of local resistance to TMV and XPV was studied, leaves of *N. glutinosa* tobacco and *Gomphrena* leaves were treated with preparations of double-stranded RNA at c = 88 mcg/ml whereas the control was treated with buffer. In the experiments on tobacco, the leaves were inoculated with TMV 4, 24, 48, 96, 120, and 144 hours after being treated with double-stranded RNA, and in the experiments on *Gomphrena* the leaves were inoculated with XPV 4, 24, 48, and 96 hours after treatment with double-stranded RNA. As is evident from Table 3, treating the tobacco leaves with preparations of double-stranded RNA significantly reduced the number of TMV-induced necroses. A protection level up to 70.9 percent and more appeared when treatment with double-stranded RNA was administered 24 hours before inoculation with TMV. The induction of local resistance reached a maximal protection level (93.4 to 88.1 percent) when the time to inoculation with TMV was 48 and 72 hours, and the minimal level was reached (4.4 percent) when the time to inoculation with TMV was 144 hours.

Table 3. Dependence of Development of Local Resistance of *N. glutinosa* Tobacco Leaves to TMV on Time After Treatment With Double-Stranded RNA (With RNA = 88 mcg/ml)

Time Before Inoculation With TMV, h	Mean No. Necroses per Leaf	Inhibition of Virus' Infectiousness, %
4	107 \pm 6.7	35.3
24	48 \pm 5.3	70.9
48	11 \pm 4.9	93.4
72	20 \pm 5.0	88.1
96	34 \pm 3.5	79.6
120	53 \pm 2.7	68.2
144	159 \pm 2.7	4.4
Control	166 \pm 6.6	--

P < .02

In the experiments with the *Gomphrena* leaves, a nearly identical (43.4 to 48 percent) inhibition of the infectiousness of XPV virus (Table 4) was noted 4,

24, and 48 hours after they were treated with double-stranded RNA. Ninety-six hours after the leaves were treated with double-stranded RNA, the inhibition of the virus' infectiousness was reduced to 18.2 percent.

Table 4. Dependence of Development of Local Resistance of Gomphrena Leaves to XPV on Time After Treatment With Double-Stranded RNA (With RNA = 88 mcg/ml)

Time Before Inoculation With XPV, h	Mean No. Necroses per Leaf	Inhibition of Virus' Infectiousness, %
4	32 \pm 2.8	43.4
24	29 \pm 2.6	48.0
48	30 \pm 2.5	45.5
96	46 \pm 2.6	18.2
Control	56 \pm 3.8	--

P < .002

Changing the concentration (c) of double-stranded RNA, both in the experiments with tobacco (Table 5) and with Gomphrena (Table 6), did not result in an equal change in protective effect. No significant change in the level of resistance to TMV and XPV induced in the plants under study was noted when the concentration of double-stranded RNA was increased to 880 mcg/ml and reduced to 8.8 mcg/ml.

Table 5. Dependence of Development of Local Resistance of Leaves of N. glutinosa Tobacco to Infection With TMV on Concentration of Double-Stranded RNA

c, mcg/ml	Mean No. Necroses per Tobacco Leaf	Inhibition of Virus' Infectiousness, %
880	2 \pm 5.5	98.6
440	2 \pm 5.6	98.2
220	11 \pm 5.5	89.9
88	7 \pm 5.4	93.4
8.8	4 \pm 5.4	96.0
0.88	78 \pm 5.9	29.5
Control	111 \pm 9.8	--

P < .001

Table 6. Dependence of Development of Local Resistance of Gomphrena Leaves to Infection With XPV on Concentration of Double-Stranded RNA

c, mcg/ml	Mean No. Necroses per Gomphrena Leaf	Inhibition of Virus' Infectiousness, %
880	59 \pm 2.3	23.4
88	54 \pm 3.0	29.1
8.8	60 \pm 2.5	21.3
Control	77 \pm 5.2	--

P < .001

A reduction in the dimensions of the necrotic infections and a 1-day delay in the appearance of symptoms (Figure 1) were noted in the experimental tobacco leaves compared with the control. The data obtained confirm that the viral infection is limited not by direct inactivation of the virus but rather by the induction of antiviral substances in ultrasensitive plants.

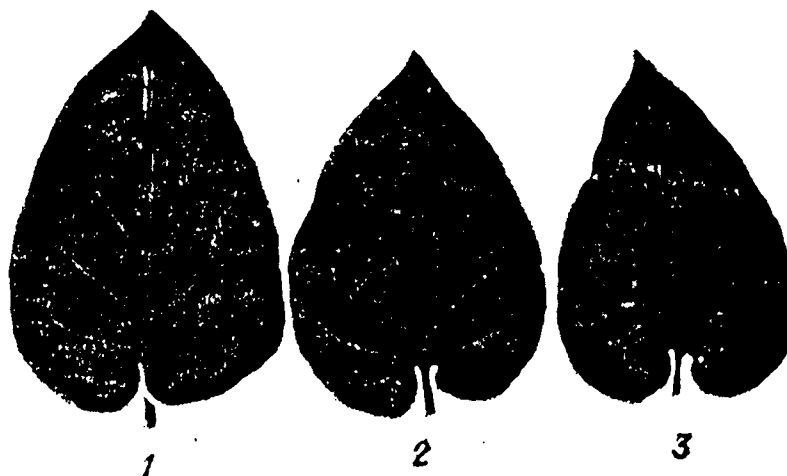


Figure 1. Leaves of *N. glutinosa* treated with double-stranded RNA 24 hours before inoculation with TMV (1, 2) and a leaf inoculated with TMV (control) (3).

Systemic resistance to TMV and XPV that has been induced by preparations of double-stranded RNA was detected in the leaves of plants that were located above the leaves that were treated with the inductor and inoculated with the virus.

In experiments with Samsun tobacco plants, the level of systemic resistance to TMV barely reached 35 percent (Table 7) 24 hours after the leaves were treated with preparations of double-stranded RNA; however, it increased significantly (up to 82 percent) 72 hours after treatment.

Table 7. Effect of Double-Stranded RNA on the Development of Systemic Resistance to Infection With TMV (With Double-Stranded RNA = 120 mcg/ml) in

Tobacco Plants of the Variety Samsun

Time Before Inoculation With TMV, h	c TMV, mcg/ml Sap		Inhibition of Virus's Infectiousness, %
	Experimental	Control	
24	3.3 \pm 0.3	5.0 \pm 0.5	35
72	2.4 \pm 0.2	13.3 \pm 0.5	82

P < .001

In Datura plants treated with double-stranded RNA and inoculated with XPV, the virus accumulated to a lesser degree than in the control (Table 8).

Table 8. Effect of Double-Stranded RNA on the Development in Datura Plants of Systemic Resistance to Infection With XPV (With Double-Stranded RNA = 160 mcg/ml)

Time Before Inoculation With XPV, h	c TMV, mcg/ml Sap		Inhibition of Virus's Infectiousness, %
	Experimental	Control	
24	0.7 \pm 0.2	4.4 \pm 0.3	85.3
72	0.2 \pm 0.1	3.8 \pm 0.1	95.7

P < .001

The data obtained confirm the effect of double-stranded RNA on the mechanisms that limit the reproduction and transfer of virus into the host's system.

4. Conclusions.

1. The studies conducted confirm that preparations of double-stranded RNA that have been isolated from Saccharomyces yeasts are capable of inducing resistance to TMV and XPV in tobacco and Gomphrena plants reacting to viral infection by the formation of local necrotic injuries.

2. The induction of local resistance to TMV in tobacco reached a maximal protective level when the plant leaves were treated with double-stranded RNA 24 to 120 hours before being inoculated with virus, and the level did not depend on the concentration of preparation within the range 8.8 to 880 mcg/ml.

The preparations of double-stranded RNA possessed the capability of inducing systemic resistance to TMV and XPV in tobacco (of the variety Samsun) and datura.

4. The preparations of double-stranded RNA did not significantly reduce the infectiousness of TMV in the in vitro experiments; however, the infectiousness of XPV was inhibited.

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12794

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MECHANISMS OF CHEMICAL IMMUNIZATION OF RYE AGAINST RUST INFECTION

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 30, No 10, Oct 86 (manuscript received 6 Mar 81) pp 950-953

[Article by E.P. Komarova and V.P. Matyushevskaya, Institute of Experimental Biology imeni V.F. Kuprevich, BSSR Academy of Sciences (Figures 1 and 2 are not included in this translation)]

[Text] Agricultural crops are currently protected against pathogenic micro-organisms in two ways: by breeding resistant varieties and by subjecting susceptible plants to chemotherapy. The immunization of plants with environmentally-harmless systemic preparations is the most promising of the chemical protection methods. It is therefore very important from a theoretical and practical standpoint to study the mechanisms of chemical immunization, since an explanation of said mechanisms will help increase the effectiveness of and optimize chemical protection means.

The present work deals with the study of the mechanisms behind the immunizing effect exhibited by systemic fungicides of the triazole series (tilt, baytan) and the antibiotic trichothecium, which trigger absolute or relatively high resistance (depending on the concentration of the preparation) to rust in rye tissues susceptible to rust [1, 2].

The Belorusskaya 23 variety of rust-susceptible rye was cultivated under greenhouse conditions and sprayed with an aqueous solution of the preparation during the phase in which it had a single leaf. Used here as opposed to work [2] were the minimum concentrations of tilt and trichothecium (0.005% active substance) recommended for production with the objective of decreasing the danger of chemical pollution to the biosphere. The treated leaves were taken for analysis after 48 hours. The grain soaked in a concentrated aqueous baytan suspension (calculated for 2 kg/ton of seeds) was subjected to preliminary inoculation treatment for 24 hours at a temperature of from 28 to 30°C, which facilitates a more active penetration of the seed dressing preparation into the seeds. The plants immunized with baytan underwent analysis when they were 2 to 3 weeks old.

Biochemical studies on the immunized plants were conducted in two stages. Examined during the first stage was the influence which triazole fungicides and a trichothecium biopreparation have on phenol metabolism in the leaves of

healthy rust, the rate of which determines the natural resistance of many plants to diseases. In other words, the mechanisms behind the immunizing effect of preparations were studied in two-component systems--plant-fungicide and plant-antibiotic. Determined to this end were the general content of free phenols in treated and control plants, the effect of phenylalanineammonialyase (PAAL), which takes part in the biosynthesis of many phenol compounds, as well as the effect of peroxidase and polyphenoloxidase enzymes, which facilitate the oxidative transformation of phenols into highly toxic quinone forms.

Studied during the second stage were the mechanisms of induced rye-resistance to rust, for which, plants immunized with baytan, were subjected to biochemical analysis during the post-infection period. In other words, a three-component plant-fungicide-parasite system was studied. Since the earlier stimulation of RNA synthesis in the infected tissues of plants having a natural resistance to rust proves that the natural defense mechanisms are activated [3, 4], we used this very indicator to study the reverse reaction of immunized plants to the penetration of a pathogen. Generally-accepted modern methods indicated in our publications were employed to determine the intensity of RNA synthesis, the activity of PAAL, peroxidase and polyphenoloxidase as well as the content of phenols.

Presented in Figure 1 are the results of the studies, which make it possible to compare changes in the metabolism of phenol substances induced by triazole fungicides, the trichothecium biopreparation and metabolites of the rust-fungus *Puccinia dispersa* Erikss. et Henn. As the figure shows, treating plants with tilt and trichothecium increases the activity of PAAL in rye leaves by 17 and 48%, respectively, while PAAL activity is increased by 28% in plants immunized with baytan. The activity of the oxidative peroxidase enzyme in plants immunized with baytan also intensifies by 26%, and almost threefold in leaves treated with trichothecium and inoculated with uredospores *P. dispersa*. The activity of peroxidase was not observed to change relative to the control group in the experiment conducted with tilt, and neither was that of polyphenoloxidase in any variant of the experiment. It may be assumed based on the data presented in Figure 1 that the elevated PAAL activity in plants immunized with baytan helps increase the rate of phenol biosynthesis. Due apparently to the intensified catalytic activity of peroxidase, the phenols undergo rapid oxidation into quinone compounds without accumulating in the plant tissue. By contrast, PAAL stimulation, coupled with the lack of peroxidase and polyphenoloxidase activity in rye leaves treated with tilt, is not likely to facilitate the accumulation of quinone compounds, but of phenol compounds (the phenol content increased by 16%). Also important to note is that the changes in PAAL and peroxidase activity induced by trichothecium and uredospores *P. dispersa* are almost two and eight times higher than in the experiment in which baytan was used. Changes in the metabolism of plants exposed to tilt are the least significant.

An analysis of the experimental data shows that, while triazole fungicides and the antibiotic trichothecium induce changes of the same type in the metabolism of phenol compounds in rye plants, their inducing activity differs. The trichothecium antibiotic, a product from the vital activity of the hemiparasite fungus *Trichothecium roseum* Link, is the most active. Treating susceptible

rye plants with this antibiotic stimulates the activity of PAAL and peroxidase enzymes in their tissues to the same extent as inoculation of leaves in Derzhavin rye, which exhibits a defensive reaction to oversensitivity [1], with the uredospores of rust fungus.

Several researchers came up with similar data for onion, wheat and potato plants which indicated that biotic elicitors have a high inducing activity, especially a complex of metabolites present in a culture medium of *Botrytis allii* Munn [5], and that abiotic inducers of resistance (systemic fungicides of the oxatine series and others) have a negligible influence on the metabolic processes in plants [6, 8]. The authors of study [9] maintain that none of the industrial preparations has as high an inducing activity as a preparation of lipoglycoprotein, which is extracted from the mycelium of the phytophthora exciter in potatoes. The facts and results of our studies presented would therefore seem to indicate that biotic elicitors induce natural defensive reactions in plant tissues. It is apparent that, over many centuries of evolution, plants developed the ability to recognize metabolites of micro-organisms which could act as parasites in their tissues and, by activating all of their defensive systems, to react sharply to recognizable chemical signals, which also include the trichothecium antibiotic.

Not the same in terms of physicochemical nature, industrial fungicides exert their immunizing effect through entirely different mechanisms. As our published data indicate, systemic fungicides are unable to induce the changes in the metabolism of phenol compounds that are indispensable for a plant to successfully fight off a parasite, as opposed to phytopathogens and biogenic inducers of resistance. In all likelihood, fungicides induce reciprocal reactions of a different kind in the cell of a plant, such as common protective and restorative processes which are not aimed at fighting a living, aggressively resisting, organism, but merely at detoxicating foreign chemical agents. The shifts which they induce in the metabolism of phenol compounds are therefore quite moderate in their intensity.

Part of the group of biologically active substances, phenol compounds are known to induce physiological stimulation of a plant cell and influence the function of plasma membranes [10]. This can change the sensitivity of the cell to parasite metabolites and how it reacts to assimilate the parasite into the host tissue.

On the other hand, triazole fungicides--strong inhibitors in the biosynthesis of ergosterol, which participates in the structural organization of cell membranes in the pathogen [11, 12]--seem to change the natural characteristics of membranes in fungi, increasing their permeability. As a result of this, toxic metabolites of the parasite, functioning as inducers in the defensive reaction of plants, permeate the tissues of the plant in addition to the "protective coloration" metabolites.

Hence, the data obtained indicate that, while triazole fungicides do not themselves directly activate the defensive mechanisms of rye plants, they do prepare the plant for a confrontation with a parasite by "arming it to the teeth" through influencing the physiological condition of the plant cell on the

one hand and the physicochemical properties of pathogen membranes on the other. Indeed, the rate of RNA synthesis increases sharply in tissues of rye plants immunized with baytan 16 hours after their inoculation, as it does in the leaves of resistant Derzhavin rye infected with the uredospores of rust fungus (Figures 2). This fact indicates that susceptible plants immunized with triazole fungicides acquire a basic trait of phytoimmunity--the unique ability to recognize parasite metabolites in the earliest stages of their interaction with it and set off the natural defense mechanisms at the right time. Unlike the trichothecium antibiotic which directly induces defensive reactions in the plant tissue, then, triazole fungicides somehow influence the mechanisms of recognition in the plant-parasite system and in so doing help the susceptible plant to recognize a dangerous antagonist in a compatible pathogen.

In our view, the data in works [13-15]--which show an insignificant stimulation of PAAL, peroxidase and other enzymes in the tissues of healthy plants exposed to systemic fungicides as well as that these enzymes exhibit a high level of activity in treated leaves during the post-infection period--also indicate that natural defense mechanisms are activated in the tissues of immunized wheat, pea and rice plants when they come into contact with a compatible pathogen.

It should be said in conclusion that chemical immunization in plants is a sophisticated process involving multiple stages and factors in which all chemical preparations actively impact both the plant and the pathogen, exerting not only a sensitizing but also a direct fungitoxic effect. In order to learn the intricate mechanisms involved in chemical immunization, it is therefore important that comprehensive--and not disjointed--studies be carried out simultaneously on the following systems: pathogen-preparation, plant-preparation, plant-preparation-pathogen, susceptible plant-pathogen, resistant plant-pathogen. Only a comprehensive contrastive analysis of the systems cited will make it possible to reveal the true mechanisms behind chemical immunization and induced plant resistance (the latter will probably turn out to be a natural defensive reaction against an artificially-induced pathogenic microorganism). Special attention should be focused on the aspect of research involving the membranes, since it is there that the first interaction between the plant cell and chemical preparations as well as the metabolites of the pathogen occurs.

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13126/13046

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BIOECOLOGIC CHARACTERISTICS OF DEVELOPMENT OF WHEAT MILDEW IN CENTRAL ASIA

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 6, Nov-Dec 86
(manuscript received 15 Jul 85) pp 19-22

[Article by L.N. Guz, Central Asian Scientific Research Institute of
Phytopathology]

[Abstract] Over 400 mildew fungi have been identified in Turkmenia, Tajikistan and Uzbekistan which lead to a 40-75% loss of wheat harvest annually. Three of them are especially harmful to wheat: stem, brown and yellow mildew. Annual development cycle of wheat mildew pathogens was studied. Infection centers were found in mountainous areas of Central Asia: Weeds infected with mildew pathogens are the source of wheat disease, the infection occurring in late autumn and reinforced in spring. The pathogens of wheat mildew are of the endemic type. Data obtained in greenhouses and out in the fields showed that the height and number of productive stalks of infected wheat were diminished along with the number of grains in each spike. References 5 (Russian).

7813/13046
CSO: 1840/682

UDC 633.11:582.001.4

SYNTHESIS OF HEXAPLOID POLONICUM-LIKE WINTERING WHEAT TRITICUM AESTIVUM L.
SUBSP. HEXAPOLONICUM AVAN

Yerevan BIOLOGICHESKIY ZHURNAL ARMENII in Russian Vol 39, No 11, Nov 86
(manuscript received 3 Oct 85) pp 952-955

[Article by S.Kh. Galstyan-Avaneyan, Sisiyansk Zonal Experimental Station,
Scientific Research Institute of Zoology, State Agricultural Industry, ArSSR]

[Abstract] Crossing *T. polonicum* L. var. *Villosum* Haller with *T. PERSICUM* av. ex. Zhuk, var. *stramineum* Zhuk yielded an intermediate hybrid F_1 . In an attempt to secure the heterosis, a morphologically intermediate form was obtained: *persico-polonicum* (P-P). In winter of 1978, under hothouse conditions, castrated (P-P) flowers were pollinated with pollen of a heterozygotic

compound hybrid [(c-50FXLutescens 10)F₁X C-43a]F₄. From the second generation a number of new plants, intermediate between soft and Polish wheat, were obtained. Their general properties, grain composition, life style and various diseases were described. Figures 1; references 4 (Russian).

7813/13046
CSO: 1840/673

UDC 575.24.581.192:581.193

USE OF GIBBERELIC ACID IN AGRICULTURE

Yerevan BIOLOGICHESKIY ZHURNAL ARMENII in Russian Vol 39, No 10, Oct 86
(manuscript received 30 Jun 86) pp 878-884

[Article by N.P. Beglyaran, Chair of Genetics and Cytology, Yerevan State University]

[Abstract] Trials were conducted under hothouse and field conditions to assess the efficacy of seed pretreatment with gibberellic acid (GA) on crop quality in the case of tomatoes and cucumbers. In the hothouse experiments, the seeds of a variety of tomato and cucumber lines were pretreated with 0.01% GA, and in the field trials with 0.02% GA. In both situations and with both plants GA pretreatment accelerated seed germination by 2-7 days and fruit production by 12-20 days. These apparent changes were accompanied by greater metabolic efficiency and in 25-50% increase in the harvests. References 32: 24 Russian, 8 Western.

12172/13046
CSO: 1840/672

UDC 633.11:633.14:631.523/527:581.3

GENETIC PRINCIPLES FOR CREATION OF TRITICALE (XTRITICALE). PART 4. EMBRYO CULTURE METHOD IN CREATION OF PRIMARY HEXAPLOID TRITICALE

Moscow GENETIKA in Russian Vol 22, No 1, Jan 86 (manuscript received 14 Mar 85; final version received 27 May 85) pp 112-118

[Article by I.A. Gordey and L.F. Khodortsova, Belorussian Scientific Research Institute of Agriculture, Minsk Oblast]

[Abstract] Major results are presented from studies intended to increase the effectiveness of the embryo culture method for the creation of primary hexaploid triticale on the genetic basis of high-yield varieties of tetraploid wheat and diploid rye. The studies showed that the winter and spring hard wheat varieties used to synthesize the new hexaploid triticale varieties differed in their capability for crossing with di- and tetraploid rye. The dominant incompatibility alleles influenced the sprouting and fertilization

process, as well as the development of the endosperm and hybrid seed. The use of immunodepressants and physiologically-active substances allows the progamic incompatibility to be overcome. The antioxidant tomatoside reliably increased the yield of wheat-rye amphihaploids, possibly as a result of the inhibiting influence on the dominant incompatibility alleles in the progamic and postgamic periods. Laser radiation significantly increased the yield of wheat-rye regenerates, apparently as a result of the energetic effect of the light radiation on the metabolism of the embryos. Figures 3; references 19: 9 Russian, 10 Western.

6508/13046
CSO: 1840/637

UDC 575.42:633.11:632

GENETIC ANALYSIS OF RESISTANCE OF SOFT WHEAT SPECIMENS (TRITICUM AESTIVUM L.)
TO POWDERY MILDEW

Moscow GENETIKA in Russian Vol 22, No 9, Sep 86 (manuscript received 28 Nov 85)
pp 2303-2309

[Article by T.V. Lebedeva, All-Union Scientific Research Institute of the Plant Industry imeni N.I. Vavilov, Leningrad]

[Abstract] Results are presented from identification of resistance genes in varieties and lines of soft wheat which have been found resistant to powdery mildew fungus in the northwestern USSR. Of 20 varieties analyzed, the resistance of 10 was determined by the genome Pm4b, that of 5--by Mld. Other strains carried resistance not determined by either of these two dominant resistance genes. In four varieties, susceptibility increased at higher temperatures (over 25°C). References 20: 3 Russian, 17 Western.

6508/13046
CSO: 1840/645

UDC 575.1:633.11

STUDY OF MONOSOMAL LINES OF SPRING COMMON WHEAT VARIETIES SARATOVSKAYA 29 AND
DIAMANT 1 UNDER VARIOUS VEGETATION CONDITIONS, BASED ON QUANTITATIVE CHARACTER-
ISTICS. PART 1. NUMBER OF SPIKELETS AND GRAINS ON MAIN EAR

Moscow GENETIKA in Russian Vol 22, No 9, Sep 86 (manuscript received 6 Jun 85;
final version received 17 Dec 85) pp 2317-1325

[Article by V.S. Arbuzova and O.I. Maystrenko, Institute of Cytology and Genetics, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] A study is presented of the effects of monosomy of each individual chromosome of wheat of two varieties which contrast in many biological and

economically important characteristics, Saratovskaya 29 and Diamant 1--by growing the progeny of monosomal plants under field conditions. This portion of the report presents data on two quantitative characteristics of immediate significance for grain productivity: the number of spikelets and number of grains of the main ear. Monosomy was found to have a predominantly negative influence on the formation of ear elements, though reliable positive effects were sometimes observed. The monosomal state of many individual chromosomes had no reliable influence on the development of various characteristics in many cases, indicating that the formation of the characteristics in question may not be related to the effects of these chromosomes. Chromosome 4B or both varieties was found to carry particularly effective genes, directly or indirectly supporting normal development of the important characteristics studied in this article. References 21: 11 Russian, 10 Western.

6508/13046
CSO: 1840/645

UDC 633.11"324":[632.524.86+632.42

BREEDING OF WINTER WHEAT FOR RESISTANCE TO FUSARIUM ROOT ROT

Moscow SELSKOKHOZYAYSTVENNAYA BIOLOGIYA in Russian No 8, Aug 86 (manuscript received 26 Dec 85) pp 96-99

[Article by F.G. Kirichenko, L.T. Babayants and Ye.A. Klechkovskaya, All-Union Breeding-Genetic Institute, Odessa]

[Abstract] The multitude of Fusarium species differing in their biological properties makes it difficult to provide a phytopathologic evaluation of breeding materials in respect to their resistance and tolerance to the pathogen. The first step in this work is the selection of resistant species to each type of pathogen. A close relationship was found between the degree of root rot development on sprouting plants and later development in adult wheat. Under field conditions, development of root rot depends on climatic conditions, other diseases, pests and related factors. Mass screening of available breeding material identified stable and resistant species: Odesskaya 57, Zirka, Erytrospermum 604/77 and others. Analysis of cross-breeding data of some of these species and even crossing with susceptible to root rot varieties produced a number of resistant or tolerant varieties (Odesskaya 51, Mironovskaya 808, Odesskaya semidwarf, Stepnyak, Yuzhnaya Zarya and Zirka). References 7: 4 Russian (1 by Western author), 3 Western.

7813/13046
CSO: 1840/1083

CORN RESISTANCE TO SMUT INFECTIONS

Moscow SELSKOKHOZYAYSTVENNAYA BIOLOGIYA in Russian No 8, Aug 86 (manuscript received 5 Dec 85) pp 100-103

[Article by I.A. Fedko, A.A. Morshchatskiy and B.A. Tereshchenko, All-Union Scientific Research Institute of Corn Growing, Dnepr Scientific Production Association for Corn, Dnepropetrovsk]

[Abstract] The principal pathogen of smut is the fungus *Sorosporium reilianum* McAlpine which produces chlamidospores causing the infections. The pathogen is preserved in soil. Breeding material was examined for varieties resistant to smut and samples were found which were not affected by wheat smut and white blister. This resistance was due to structural and physiological immunity. The resistance marker is controlled by a system of additive and nonadditive effects of polygenes; therefore, inheritance in hybrid forms is very complex. Phenotypical appearance of the marker depends on agronomic and hydrothermal conditions, effect of the maternal form, various modifying agents and can even change accidentally from year to year. No correlation was found between the length of vegetation time and infection. References 13: 9 Russian, 4 Western.

7813/13046

CSO: 1840/1083

UDC 632.937.15

PHYSIOLOGICAL AND BIOCHEMICAL CHARACTERISTICS OF VARIOUS PATHOGENIC STRAINS OF ERWINIA PHYTOPHTHORA

Moscow SELSKOKHOZYAYSTVENNAYA BIOLOGIYA in Russian No 8, Aug 86 (manuscript received 29 Jun 85) pp 109-111

[Article by A.M. Lazarev and I.I. Chernyayeva, All-Union Scientific Research Institute of Plant Protection, Leningrad-Pushkin, All-Union Scientific Research Institute of Agricultural Microbiology, Leningrad-Pushkin]

[Abstract] Black stem rot is one of the most harmful potato diseases; it is spread by *Erwinia phytophthora* Holland bacteria. Upon isolation from plants most of these bacteria lose their pathogenicity. Physiological and biological properties of the pathogenic and nonpathogenic species were analyzed and compared. Both (pathogen and nonpathogenic) strains are anaerobic; they reduce nitrates to nitrites and ammonize proteins producing hydrogen sulfide. Only the virulent strains are capable of macerating potato tissue, digesting pectate gel and gelatin, curdling milk and forming acids. The virulent strains were sensitive to NaCl, high temperature and antibiotics; nonvirulent ones were not. Virulent strains have more-developed proteolytic enzymes, hence show relatively weak growth on carbohydrate media. Avirulent strains develop faster and absorb carbohydrates. The virulent strains had better

developed proteolytic enzymes but exhibited poorer development on sugar media. References 11: 10 Russian, 1 Western.

7813/13046
CSO: 1840/1083

UDC 632.754.1:633.11

HARMFULNESS OF NEW GENERATIONS OF BUGS AND LARVAE OF PENTATOMID EURYGASTER (EURYGASTER INTEGRICEPS PUT.) ON WHEAT

Moscow SELSKOKHOZYAYSTVENNAYA BIOLOGIYA in Russian No 8, Aug 86 (manuscript received 9 Jan 86) pp 118-124

[Article by M.A. Volodichev, All-RSFSR Scientific Research Institute of Plant Protection, Ramon, Voronezh Oblast]

[Abstract] Eurygaster integriceps is one of the most destructive pests of grain fields, destroying the quality of wheat and other grains (changing the color, decreasing their mass, leading to deterioration of biochemical composition and poorer quantity and quality of gluten, even poor taste of the baked bread). Literature data covering these problems were reviewed. The degree of damage depends on the species and variety of the bugs and larvae as well as on the state of their development, soil, weather conditions, etc. Biochemical changes occurring in grain result from the enzymes introduced by the bug. Although the use of pesticides helps in controlling it, the final answer must be in developing resistant varieties. Finally, new methods are being tried to process grain and even flour for bread baking to improve the quality and taste. References 33 (Russian).

7813/13046
CSO: 1840/1083

UDC 581.132

CHLOROPLAST ACTIVITY IN VARIOUS DONOR-ACCEPTOR RELATIONSHIPS IN WHEAT GENOTYPES

Baku IZVESTIYA AKADEMII NAUK AZERBAYDZHANSKOY SSR, SERIYA BIOLOGICHESKIKH NAUK in Russian No 3, May-Jun 86 pp 3-12

[Article by E.G. Kazibekova and D.A. Aliyev, Azerbaijani Scientific Research Institute of Agriculture, Azerbaijan SSR Ministry of Agriculture]

[Abstract] A correlative study was conducted on the photochemical activity of chloroplasts and the intensity of the photosynthetic process in relation to genotype in the case of the hard winter wheat varieties Shark and Oviachik and the soft awnless variety Kavkaz. Altering the functional status of plants by either shading or removal of selected organs resulted in the demonstration

of a positive correlation between the two parameters of interest. These observations provided the basis for suggesting that the photochemical activity of chloroplasts may be used as an indicative trait in breeding studies for the creation of wheat varieties with an optimum balance of photosynthetic activity and reproductive potential. Figures 3; references 15: 5 Russian, 10 Western.

12172/13046
CSO: 1840/772

UDC 631.523:575:633.11

INHERITANCE OF PLANT HEIGHT AND PRODUCTIVITY IN HARD WHEAT HYBRIDS

Baku IZVESTIYA AKADEMII NAUK AZERBAYDZHANSKOY SSR, SERIYA BIOLOGICHESKIKH
NAUK in Russian No 3, May-Jun 86 pp 79-83

[Article by I.D. Mustafayev and A.A. Aleksanyan, Institute of Genetics and Breeding, Azerbaijan SSR Academy of Sciences]

[Abstract] A summary is presented of the results obtained on the inheritance of plant height, upper internodal length, and grain weight in F_1 and subsequent hybrid generations of hard wheat varieties cultivated in Azerbaijan, crossing tall- and short-stem parental varieties. The data revealed that the tall-stem and large internodal distance traits were under the control of two to four dominant genes. The short-stem and small internodal distance traits were determined by a combination of their recessive alleles in the homozygous state. The grain weight per plant was inherited as an incomplete dominant trait from the superior parental variety, or as a superdominant trait. In addition, intermediate hybrid varieties were also obtained in terms of plant height that, on the basis of productivity, equaled or exceeded the better of the parental forms. References 5: 4 Russian, 1 Western.

12172/13046
CSO: 1840/772

UDC 612.815.1.577.354

INTERRELATIONSHIP OF RECEPTOR BINDING SITES FOR BICYCLIC PHOSPHATE AND PHOSPHITE DERIVATIVES, PICROTOXIN AND (^3H)-GABA

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 293, No 3, Mar 87 (manuscript received 15 Jul 86) pp 736-739

[Article by G.Ya. Pervukhin, A.A. Maslov, S.A. Kotelnikov, V.B. Sokolov, V.I. Fetisov and I.V. Martynov, corresponding member, USSR Academy of Sciences, Institute of Physiologically Active Compounds, USSR Academy of Sciences, Chernogolovka, Moscow Oblast]

[Abstract] Binding studies were conducted with membrane fraction isolated from the brains of Wistar rats to establish the relationship between a series of bicyclic phosphate and phosphite derivatives, picrotoxin, and GABA in binding to GABA receptors. Determinations of binding inhibition using GABA and picrotoxin combinations, as well as picrotoxin in combination with the phosphorus compounds led to the postulation of a tripartite GABA receptor. Basically, the GABA A-receptor appears to involve three binding sites, each responding to one of the ligands in the GABA, picrotoxin, phosphite/phosphate triad. Via allosteric mechanisms the receptor components influence one another and affect the manner in which the competitors interfere with the binding of GABA. Figures 3; references 15: 1 Russian, 14 Western.

12172/13046
CSO: 1840/631

UDC 547.979.733-535.371

FLUOROIMMUNOASSAY: PORPHYRIN AS NOVEL LABEL

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 293, No 3, Mar 87 (manuscript received 25 Jul 86) pp 744-748

[Article by A.P. Savitskiy, D.B. Papkovskiy and I.V. Berezin, corresponding member, USSR Academy of Sciences, Institute of Biochemistry imeni A.N. Bakh, USSR Academy of Sciences, Moscow]

[Abstract] Experiments were conducted with porphyrins as a label suitable for application to fluoroimmunoassays. The resultant analytical data demonstrated

that coproporphyrin improved the sensitivity of the assay ca. 100-fold in comparison with techniques relying on fluorescein, allowing detection of coproporphyrin-IgG conjugates at the 0.003 nM level, using rabbit IgG antigen and sheep antibody. The system was, of course, dependent on the sensitivity of the fluorometer employed (Hitachi MPF-4). These observations demonstrated that, using porphyrin labels, fluoroimmunoassay may provide analytical results on par with those obtained with radioimmunoassay and immunoenzyme techniques in terms of sensitivity. Figures 3; references 15: 4 Russian, 11 Western.

12172/13046
CSO: 1840/631

UDC 577.113

DNA-LIKE DUPLEXES WITH REPETITIONS. PART 13. CHEMICAL ENZYMIC SYNTHESIS OF
POLYMERS CODING FOR POLYPEPTIDE (Phe-Asp)_p

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 20, No 2, Mar-Apr 86 (manuscript received 4 Jun 85) pp 489-501

[Article by O.N. Koroleva, V.K. Potapov, S.M. Gryaznov, T.S. Oretskaya, V.G. Metelev and Z.A. Shabarova, Department of Chemistry and Molecular Biology and Bioorganic Chemistry Scientific Research Problem Laboratory imeni A.N. Belozerskiy, Moscow State University imeni M.V. Lomonosov]

[Abstract] Aspects of synthesis of dodecadeoxyribonucleotides d(TTTCGACTTCGA) and d(TCGAAATCGAAG) by the block triester method and by use of the Victoria-3 automatic oligonucleotides synthesizer were described and discussed. An extended concatemer DNA-like duplex formed in the solution of an equimolar mixture of dodecanucleotides. Effective chemical and enzymic ligation of the dodecanucleotides were carried out with production of a set of polymers, coding for polypeptide (Phe-Asp)_p. Stability of complementary complexes had a significant effect upon the chemical and enzymic ligation in the concatemer systems. Decanucleotide linkers d(AATTCTTCGA and d(TTTCGAGTAC) containing restriction endonucleases sites EcoRI and KpnI were synthesized for insertion of polymers of dodecanucleotides into the plasmid vector. Polymerization of dodecanucleotides in the presence of decanucleotides was discussed. The study produced new experimental confirmation of the great influence of the complexes on the effectiveness of chemical and enzymic matrix ligation of oligonucleotides. Figures 6; references 12: 5 Russian, 7 Western.

2791/13046
CSO: 1840/568

BIOLOGICAL ACTIVITY OF POLAR LIPID OF CLOSTRIDIUM BUTYRICUM SPORES

Moscow MIKROBIOLOGIYA in Russian Vol 55, No 5, Sep-Oct 86 (manuscript received 11 May 85) pp 804-807

[Article by G.P. Gayenko, V.I. Duda, T.V. Koronelli and I.K. Pakhlavuni, Moscow State University imeni M.V. Lomonosov, Institute of Microbiology, USSR Academy of Sciences, Moscow]

[Abstract] Isolation and identification of individual lipids of *C. butyricum* spore extract and fractions which possess bacteriostatic and radio-therapeutic activity are described and discussed. Anaerobic bacterium *C. butyricum* 35/11 culture was the object of study. A fraction of polar lipids, isolated from the spores, proved to have significant radio-protective effect. This lipid fraction of the spore preparation increased the survival rate of irradiated rats by 37 percent in comparison with survival rates of control animals. This fraction produced no radio-prophylactic effect. Radio-prophylactic effect was attributed to the nonlipid fraction. The polar lipids fraction inhibited autolysis of the bacterial cell walls. Phenol glycolipid isolated from the *C. butyricum* spores inhibited growth of producer cells and promoted formation of refractive forms with concurrent inhibition of the activity of some membrane-bound enzymes (autolysins). It was assumed that the membranotropic activity changed cell metabolism and initiated the rise of anabiotic forms. Figures 1; references 17: 10 Russian, 7 Western.

2791/13046

CSO: 1840/566

UDC 577.322.2

CHANGE OF CYTOCHROME c GLOBULE COMPRESSIBILITY DURING REDOX TRANSITION

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 20, No 2, Mar-Apr 86 (manuscript received 1 Apr 85) pp 396-406

[Article by D.P. Kharakoz and A.G. Mkhitarian, Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast]

[Abstract] A study of changes of compressibility and volume of horse heart cytochrome c during redox transition involved comparison of absolute values of apparent compressibility and apparent volume of oxidized and reduced protein and differential measurements of the effect of transition effects after titration of the protein by an oxidizing agent and a reducing agent. Intrinsic compressibility of the cytochrome c globule during redox transition increased by 2.5 ± 1 percent but its volume increased by no more than 0.2 percent. Analysis of the connection between compressibility of the molecule and dynamic characteristics indicated that the change of the root-mean square amplitude of intramolecular heat movement of cytochrome c atoms during oxidation is lower by an order of magnitude of two than that reported from findings based on x-ray-structural studies found in the literature. Data concerning compressibility reported in this study contradict findings reported by Eden et al., who found that compressibility increases by 40 percent. Data presented in the study were verified by comparison of independently measured absolute values of apparent volumes and compressibilities of the oxidized and reduced protein, by differential densimetric and ultrasonic velocimetric titrations of oxidized cytochrome with ascorbate and of reduced cytochrome with ferricyanide. Figures 3; references 41: 19 Russian, 22 Western.

2791/13046

CSO: 1840/568

MECHANISM OF ACTION OF MEMBRANE-STABILIZING AGENT 1-(CHLOROMETHYL)SILATRANE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 293, No 3, Mar 87 (manuscript received 28 Jul 86) pp 724-727

[Article by Yu.V. Pisarskiy, V.B. Kazimirovskaya and M.G. Voronkov, corresponding member, USSR Academy of Sciences, Irkutsk Institute of Organic Chemistry, Siberian Department, USSR Academy of Sciences]

[Abstract] Electrophysiological, biochemical and permeability studies were conducted with a variety of membrane models to assess the nature of the mechanism of action of 1-(chloromethyl)silatrane (1-CMS) in stabilizing biological membranes. The studies, utilizing liposomes (egg yolk), bilayer lipid membranes (azolectin), and mitochondrial and reticulocyte membranes, demonstrated that as a result of its strong dipole moment--excess positive charge on the N atom and negative on the Cl and O atoms--1-CMS adsorbs to the lipid component of the membranes. Interaction of 1-CMS with the polar groups of the protein and the lipid components favors increased stabilization of the membrane as well as of the 1-CMS molecule itself. The adsorbed 1-CMS molecules 'attract' the polar heads of the lipid molecules and thereby contribute to the fluidity of their carbohydrate chains. The 'bending' of the lipid heads and the additional electrostatic forces between 1-CMS and the membrane interfere with permeability of the peroxide radicals to the alkyl chains of the lipids, thereby inhibiting lipid peroxidation. Figures 3; references 15: 12 Russian, 3 Western.

12172/13046
CSO: 1840/631

UDC 541.49:577.352.2

Ca²⁺ CONDUCTIVITY CHANNELS INDUCED BY PSEUDOCYCLIC ANALOGUE DB18K6 ON BILAYERS AND IMPREGNATED FILTERS

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 6, Nov-Dec 86 (manuscript received 15 Aug 86) p 42

[Article by U.Z. Mirkhodzhayev, Kh.F. Abdullayev, V.P. Popova and B.A. Tashmukhamedov, Institute of Physiology, UzSSR Academy of Sciences]

[Abstract] The effect of pseudocyclic crown analogue DB18K6 of flat bilayers and filters impregnated with phospholipids was examined. It was shown that this crown induces channel-type conductivity in presence of 10⁻² M Ca²⁺ ions. Induction of channel conductivity through a thick layer of phospholipids was not possible; evidently fragments of impregnated filter exist in form of bilayer structures where these Ca²⁺ channels of conductivity are also located. These impregnated filters can be used as bilayer structures with greater stability and resolution. References 3 (Russian).

7813/13046
CSO: 1840/682

PROBLEMS AND PROSPECTS IN CELLULAR BIOTECHNOLOGY OF PLANTS

Yerevan BIOLOGICHESKIY ZHURNAL ARMENII in Russian Vol 39, No 10, Oct 86
(manuscript received 5 May 86) pp 834-846

[Article by O.S. Melik-Sarkisov, All-Union Scientific Research Institute of Applied Molecular Biology and Genetics, Moscow]

[Abstract] A cursory review is presented of the application of various cellular techniques to plant and crop improvement, as such techniques apply to tissue and cell culture methods. Key points in the review deal with in vitro cultures of explants and organelles, the former to take advantage of the pluripotential nature of plant cells. Exposure of such cultures to various mutagenic agents represents an efficient approach to mutant selection, as well as in the induction of haploid and polyploid varieties. Another approach in the similar vein utilizes cell and protoplast fusion techniques to attain somatic hybridization. The use of such techniques has already resulted in the production of varieties of plants with more desirable metabolic characteristics and improved harvests. Figures 1; references 69: 22 Russian, 47 Western.

12172/13046
CSO: 1840/672

UDC 615.373.012.6:616-006-018.15-092.4

CONDITIONS FAVORING ASCITIC TUMOR FORMATION IN IN VIVO HYBRIDOMA CULTIVATION

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 7, Jul 86 (manuscript received 23 Jul 85) pp 13-17

[Article by A.S. Novokhatskiy, I.V. Malakhova, S.Ya. Gaydamovich, Ye.E. Melnikova, N.A. Sveshnikova, T.G. Mikheyeva, L.Ya. Kunitskaya, N.Ye. Litvinovich and T.M. Shutkova, Institute of Virology imeni D.I. Ivanovskiy, USSR Academy of Sciences, Moscow]

[Abstract] An assessment was conducted on factors favoring formation of ascitic tumors in syngeneic mice during in vivo cultivation of hybridomas. Studies with a series of hybridomas forming antiviral monoclonal antibodies in

BALB/c male mice (18-20 g) demonstrated that pretreatment of the animals with pristane (i.p.) resulted in a tumor development rate of 43-80%, while pretreatment with Freund's complete adjuvant yielded a rate of 31-70%. Intraperitoneal administration of angara or perfume oil, or of Bayol F, was less effective in inducing tumor formation and acculation of ascitic fluid. The time of onset of ascitic fluid formation was inversely related to the dose of cells injected intraperitoneally, while the volume of ascitic fluid formed was dependent on the type of hybridoma rather than the cell concentration. Harvesting studies demonstrated that irrigation of the peritoneal cavity with physiological saline or culture medium free of serum after withdrawal of ascitic fluid resulted in additional recovery of 2.6 to 13.7 million hybridoma cells, as well as of monoclonal antibodies. References 15: 3 Russian, 12 Western.

12172/13046
CSO: 1840/617

UDC 579.842.11.064

MECHANISM OF LIMITATION OF GROWTH OF ESCHERICHIA COLI RECOMBINANT STRAIN

Moscow MIKROBIOLOGIYA in Russian Vol 55, No 5, Sep-Oct 86 (manuscript received 3 Jan 85) pp 781-786

[Article by Ye.L. Golovlev, Yu.G. Ivanitskaya and V.B. Keshelava, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino]

[Abstract] An attempt to identify the metabolic stage which determines kinetic parameters of growth of *E. coli* used a recombinant strain EcoR-V as the object of study. Growing the recombinant strain in batch and continuous cultures showed a close resemblance between its growth and that of some forms of so-called glucose-sensitive yeasts. Batch growth of the strain was diauxic but growth curves of the continuous culture were hyperbolic at high flow rates. It was assumed that the mechanism of the phenomenon is based on saturation by a substrate of one of the initial reactions of the tricarboxylic acid cycle or reactions directly preceding the tricarboxylic acid cycle. The saturated reaction may be the limiting link in metabolism of both continuous and batch cultures at high rates of growth. The possibility of powerful induced synthesis of restrictase in cells of the strain made it possible to establish a new method of search for limiting links in *E. coli* metabolism and to confirm the hypothesis advanced. The essence of the method is based on the fact that assembly of all remaining proteins in the cells practically ceases during restrictase synthesis and the enzymic composition of the cell is fixed at a certain time (about 30-40 minutes) according to the physiological state of the culture at the moment of temperature increase. Results of incubation of the strain with induced protein synthesis on media with different additives confirmed the hypothesis. Figures 3; references 20: 5 Russian, 15 Western.

2791/13046
CSO: 1840/566

UDC 613.648+614.73]-07

AUTOMATED ENVIRONMENTAL RADIATION MONITORING SYSTEM

Moscow GIGIYENA I SANITARIYA in Russian No 5, May 86 (manuscript received 24 Jul 85) pp 75-76

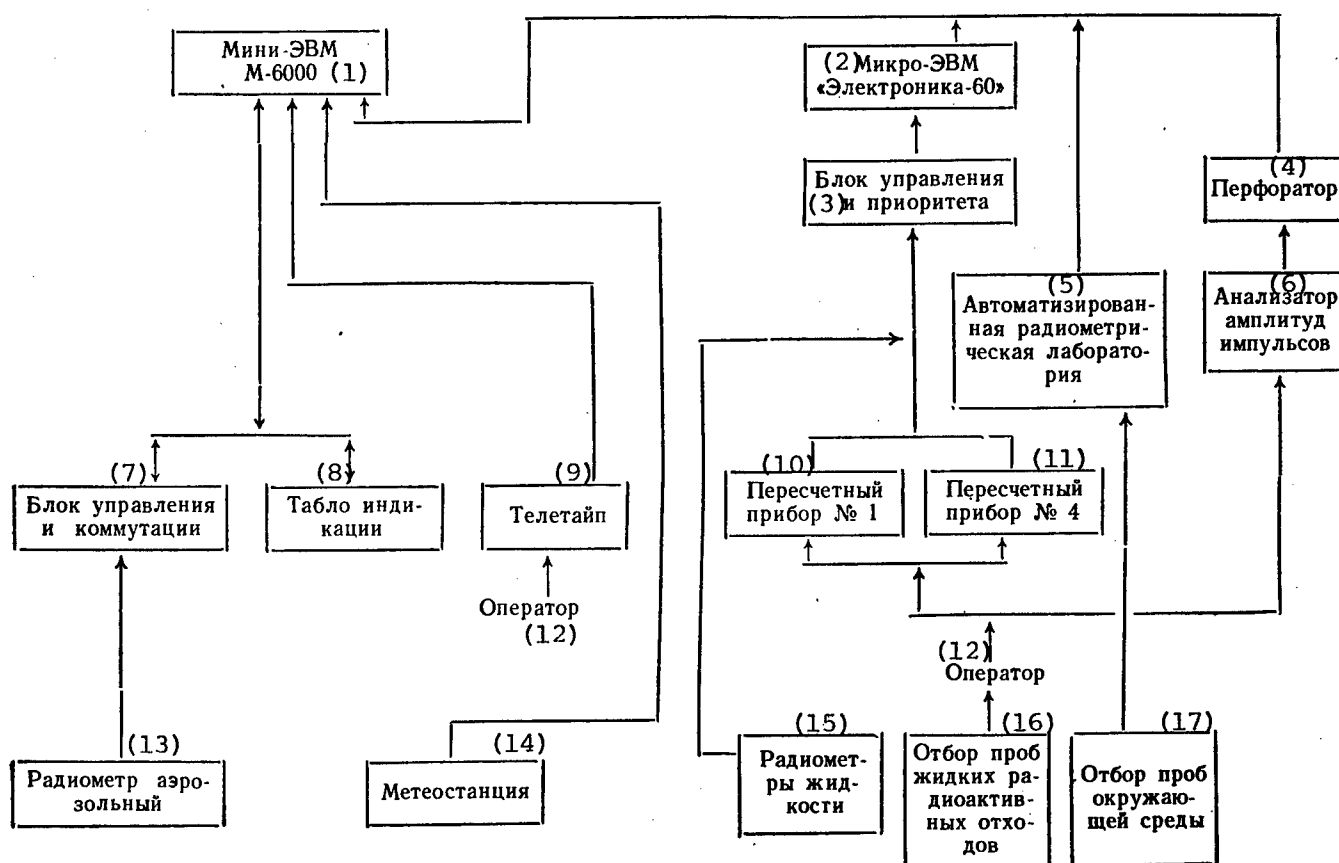
[Article by V. G. Zarkh and I. A. Sobolev, Moscow Scientific Production Association Radon]

[Text] A number of communications have been devoted to problems of developing automated environmental radiation monitoring systems [1-3]. The hardware and software of an automated system, introduced into the radiation safety service, are considered in this paper.

The system includes monitoring of radioactive discharges into the atmosphere and plotting of radio nuclide concentration fields in the zone where the flare touches the ground, the activity discharged into the atmosphere with regard to existing meteorological conditions, monitoring the content of radioactive substances in liquid wastes discharged directly into sewers and radiation monitoring of environmental objects--atmospheric air and precipitation, soil and vegetation, flood and pipeline water, water of open reservoirs and soil. A block diagram of the system is presented below. The system has a three-level structure.

An automated radiometric laboratory, operating autonomously or online with the M-6000 computer, forms the first level of the system. Its composition and block diagram were described previously [4].

The second level of the system includes an Elektronika-60 microcomputer, designed to process data from monitoring the content of radioactive substances in liquid wastes, discharged into sewers. RZhS-05 radiometers are used for monitoring, samples are taken and the samples are subsequently analyzed radiometrically and spectrometrically. The information from the radiometer is read automatically through a developed control and priority module and is fed to the microcomputer. Samples of liquid radioactive wastes are measured on counting instruments, which are also connected to the microcomputer. The data required for the calculations are entered through the display. The results of online processing are printed, punched and are fed to the minicomputer for final processing and storage.



Block Diagram of Automated Environmental Radiation Monitoring System

KEY:

- | | |
|-------------------------------------|--------------------------------------|
| 1. M-6000 minicomputer | 10. Counting instrument No. 1 |
| 2. Elektronika-60 microcomputer | 11. Counting instrument No. 4 |
| 3. Control and priority module | 12. Operator |
| 4. Perforator | 13. Aerosol radiometer |
| 5. Automated radiometric laboratory | 14. Meteorological station |
| 6. Pulse amplitude analyzer | 15. Liquid radiometers |
| 7. control and switching module | 16. Liquid radioactive waste sampler |
| 8. Display board | 17. Environmental sampler |
| 9. Teletype | |

The M-6000 minicomputer, designed for statistical processing and storage of environmental radiation monitoring data, for monitoring the content of radioactive substances in liquid wastes and also for monitoring radioactive discharges into the atmosphere and calculating the radio nuclide concentration fields in the zone where the flare touches the ground and the activity discharged into the atmosphere, is at the third level. Radioactive discharges are monitored by using the RA12S-1 aerosol radiometer. Analog signals of the radiometer are delivered through the developed control and switching module to the analog-digital converter of the M-6000 computer. The process data are delivered to the display board or are printed on a teletype as the radiation supervisor who controls the teletype requires. The information about the

activity discharged into the atmosphere is used to calculate the radionuclide concentration fields.

The wind velocity and direction and the absolute air temperature at different altitudes must be known in the automated radioactive discharge monitoring system to calculate the radio nuclide concentration fields in the zone where the flare touches the ground to calculate the activity discharged into the atmosphere. These data are now entered into the minicomputer into the teletype. They will subsequently be entered in the system in the form of analog signals from the meteorological station of type M63MR.

A table, in which are indicated the mean and maximum 24-hour specific concentration of the α - and β -activity of nuclides, the activity discharged into the atmosphere and the fraction of this value from the maximum permissible and test discharges and also the total operating time of ventilators, is printed out as the radiation supervisor, who controls the teletype, requires.

The program automatically monitors the discharged activity and a message is printed with indication of the date and time of the measurement upon which an excess is noted if such an excess occurs. The daily monitoring results are generalized in monthly reports and are stored in the external memories of the minicomputer. The accumulated indicators are processed by statistical analysis programs upon requirement of the radiation safety service.

Considerable attention was devoted to increasing the information content of monitoring when developing the automated environmental radiation monitoring system. A unified approach to processing the accumulated data was developed for this purpose for all radiation monitoring facilities and specific algorithms and statistical processing programs were developed. They include parametric data processing and verification of hypotheses, pair and multiple correlation-regression analysis, plotting of radio nuclide concentration fields by the polynomial method and by optimal interpolation and plotting the models of variation of the radiation situation in time and predicting this model.

Introduction of the automated environmental radiation monitoring system made it possible to eliminate the laborious manual operations of acquisition, processing and accumulation of the monitoring results; introduction made it possible to free personnel of the radiation safety services to perform more skilled jobs and to increase the current nature of monitoring, to systematize the accounting forms and to increase the performance of monitoring (the radiometric measurements of low-active environmental radiation monitoring samples provide a fourfold increase in the automated radiometric laboratory and an up to tenfold increase in measurement of more active samples). Introduction of the system also made it possible to improve the information content of monitoring through introduction of more improved methods of processing the monitoring results.

The automated system is now being developed further and it is being decentralized through broader use of microcomputers.

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6521

CSO: 1840/721

UDC 616.1:313.13([47+57]-22)

INCIDENCE OF MAJOR CARDIOVASCULAR DISEASES IN RURAL AREAS

Moscow SOVETSKAYA MEDITSINA in Russian No 10, Oct 86 (manuscript received 24 Dec 85) pp 58-61

[Article by T.N. Ardamatskaya, M.M. Oleynik, A.I. Sabitov, L.M. Lyapina and A.V. Volgina, Saratov Branch, Leningrad Scientific Research Institute of Cardiology]

[Abstract] An analysis was conducted on the morbidity of cardiovascular disorders in the rural rayons of the Saratov Oblast, employing a cohort of 1,630 subjects. The data demonstrated that approximately 25% of the cohort had major problems. On a breakdown basis, the incidence of hypertension was 13.5% among the males and 22.3% among the females. Ischemic heart disease afflicted 10.6% of the males and 9.0% of the females. In 41% of the cases with hypertension and ischemic heart disease these problems were uncovered for the first time during the study, suggesting that the generally assumed low morbidity reported for the rural population may be a gross underrepresentation. References 4 (Russian).

12172/13046
CSO: 1840/683

UDC 575:591

MEDIAL-GENETIC STUDY OF POPULATION OF KOSTROMA OBLAST. PART 3. COEFFICIENT OF INBREEDING AND ITS DYNAMICS IN RURAL POPULATIONS AND RAYON-SCALE CITIES

Moscow GENETIKA in Russian Vol 22, No 9, Sep 86 (manuscript received 28 Nov 85)
pp 2355-2360

[Article by G.M. Paradeyeva, L.P. Bolshakova, A.N. Petrin, G.I. Rusakova, A.G. Koroleva, Ye.K. Ginter and A.A. Revazov, Institute of Medical Genetics, USSR Academy of Medical Sciences, Moscow]

[Abstract] A study is reported of the inbreeding coefficient and its components by the method of isonimy, and also through endogamy, analysis of the dynamics of the inbreeding coefficient in rural and urban populations of Kostroma Oblast. The coefficient of inbreeding was only half as great in new villages as in old ones. Inbreeding is less in cities than in villages, although this is judged to be largely a result of the greater availability of possible partners in cities rather than a result of intentional avoidance of marriage with relatives. The decrease in inbreeding has resulted largely from the disappearance of social stratification since the revolution in small villages, thus broadening the pool of available marriage partners. References 10: 6 Russian, 4 Western.

6508/13046
CSO: 1840/645

UDC 575.224:579.841.11

HFR DONORS OF PHOTOTROPHIC NITROGEN-FIXING BACTERIUM RHODOPSEUDOMONAS SPHAEROIDES. LOCATION OF MUTATIONS IN GENES CONTROLLING NITROGEN FIXATION

Moscow GENETIKA in Russian Vol 22, No 11, Nov 86 (manuscript received 19 Mar 86)
pp 2664-2673

[Article by S.V. Kamenev, T.P. Polivtseva, N.V. Belavna and S.V. Shestakov, Department of Genetics and Selective Breeding, Moscow State University imeni M.V. Lomonosov]

[Abstract] The hybrid plasmid pAS8-121 of the intestinal bacillus is transmitted to phototrophic nitrogen fixing bacteria R. sphaeroides in interspecies

conjugation crossings, but does not replicate. This allows production of clones with insertions of the plasmid in the chromosome--*R. sphaeroides*::pAS8-121. This work utilizes pAS8-121 from *R. sphaeroides* 2R donors moderating polarized transfer of the chromosome of this bacterium and localization of gene mutations controlling nitrogen fixation. The key gene regulators of these bacteria may be used for the creation of new optimized nitrogen-fixation systems. Donor strains were obtained with polarized chromosomal gene transfer with frequencies of 10^{-3} to 10^{-7} per donor cell. The use of the 6 Hfr strains produced by the author demonstrates that the majority of the mutations to the genes *nif*, *gln* and *glu*, controlling nitrogen fixation, are located in a rather long sector of the chromosome between the markers *nal^r* and *rif^r*. Within the limits of the *nal^r*-*rif^r* area of *R. sphaeroides* 2R, the authors identified two regions for location of gene mutations controlling nitrogen fixation. One of them includes the *Nif⁻* mutation and is connected to the *nal^r* marker; the second consists of two nonintersecting groups of *Gln⁻* and *Glu⁻* mutations and occupies the area of the chromosome from the center of the *nal^r*-*rif^r* fragment in the direction of the *rif^r* marker. Figures 2; references 15: 8 Russian, 7 Western.

6508/13046
CSO: 1840/647

UDC 577.21:578.08

NEW METHOD OF SYNTHESIS AND CLONING OF cDNA

Moscow GENETIKA in Russian Vol 22, No 1, Jan 86 (manuscript received 4 Jun 84)
pp 172-174

[Article by A.Yu. Borovkov, Institute of Cytology and Genetics, Siberian Department, USSR Academy of Sciences, Novosibirsk]

[Abstract] A new method is suggested for synthesis and cloning of cDNA which is simpler than the connector method and methods using a plasmid seed. The plasmid pUC18 was split with restrictase PstI. Oligo dT was grown on the 3'-ends thus formed and used as a seed for synthesis of cDNA. The method allows production of more than 10^4 recombinant clones per μ g of initial mRNA, at least an order of magnitude greater than that achieved by the connector method. The SI-nuclease treatment is also avoided. The method is similar to but much less cumbersome than the method suggested by Okayama and Berg. The method can in practice use virtually any plasmid, even those containing no sites for restrictase yielding a free 3'-end, though such plasmids are less convenient and may require additional stages. Figures 1; references 5 (Western).

6508/13046
CSO: 1840/637

ANALYSIS OF NOPALINE-TYPE Ti PLASMID MINI-REPLICON OF AGROBACTERIUM TUMEFACIENS C58 AND POSSIBILITY OF ITS USE TO TRANSFER FOREIGN GENES INTO PLANTS

Moscow GENETIKA in Russian Vol 22, No 11, Nov 86 (manuscript received 20 Feb 86)
pp 2674-2683

[Article by E.S. Piruzyan and V.M. Andrianov, Institute of Molecular Genetics,
USSR Academy of Sciences, Moscow]

[Abstract] Results are presented from cloning of restriction fragments of DNA of the plasmid pTiC58 by means of the pBR325 vector and identification in the resulting clone bank of the bireplicon plasmid pSPA044, capable of independent replication in cells of both *E. coli* and *A. tumefaciens*, as well as various species of *Rhizobium*. Restriction mapping and mutagenesis with Tn5 transposon allowed identification of the minimal fragment assuring independent replication in agrobacterium cells. It was shown that the plasmid pSPA044, as a result of certain modifications, can be used to transfer foreign genetic information into plant cells. Figures 3; references 19: 8 Russian, 11 Western.

6508/13046
CSO: 1840/647

PLASMIDS DETERMINING RESISTANCE TO $HgCl_2$ IN ACINETOBACTER: OCCURRENCE IN VARIOUS MERCURY DEPOSITS

Moscow GENETIKA in Russian Vol 22, No 11, Nov 86 (manuscript received 11 Apr 86)
pp 2684-2692

[Article by S.Z. Mindlin, Zh.M. Gorlenko, O.L. Lomovskaya, Ye.S. Bogdanova, E.S. Kalyaeva, A.I. Gragerov, V.G. Nikiforov and R.B. Khesin (deceased),
Institute of Molecular Genetics, USSR Academy of Sciences, Moscow]

[Abstract] Resistance to mercury salts is widespread among clinical bacteria isolates; determinants are found on plasmids in transposons, frequently together with antibiotic-resistance determinants. R.B. Khesin has suggested that mercury-resistance determinants developed in soil bacteria exposed to mercury in natural deposits, from which they have been propagated by plasmids and transposons through bacteria colonizing animal carriers. This article studied the occurrence of the carrier system among acinetobacter species isolated from three geographically-remote mercury deposits. The results indicated that the plasmid Hg^R -determinants of soil bacteria of the genus acinetobacter isolated from mercury deposits have significant similarity to the Hg^R -determinants of clinical isolates, coding similar protein products and manifesting significant homology in the nucleotide sequence, indicating a common evolutionary origin. The nucleotide sequence of a sector of mercury-reductase gene is represented with an asterisk (*), indicating nonidentical

nucleotides in three different bacteria. The data may indicate that populations of soil bacteria separated by thousands of kilometers are not isolated from each other, but can exchange plasmids. The nucleotide sequences of pKLH1-like plasmids from different deposits are presently being studied to confirm this. Figures 7; references 20: 7 Russian, 13 Western.

6508/13046
CSO: 1840/647

UDC 579.252.5

CHARACTERISTICS OF DERIVATIVES OF RP4 PLASMID WITH BROAD HOST SPECTRUM WITH
VARIABLE PROPERTIES OF MAINTENANCE AND HEREDITY

Moscow GENETIKA in Russian Vol 22, No 11, Nov 86 (manuscript received 24 Oct 85;
final version received 10 Mar 86) pp 2693-2701

[Article by P. Dobrovolski and V.A. Sakanyan, Institute of Genetics and
Selective Breeding of Industrial Microorganisms, Moscow; Scientific Research
Technologic Institute of Amino Acids, Yerevan]

[Abstract] Sodium bisulfate was used to produce a deletion mutant pPD6 which lost all known *kil*- and *kor*- genes but retained the regions *oriV* and *trfA* of the RP4 plasmid. This plasmid can be transferred to the cells of *Agrobacterium tumefaciens*, *Rhizobium meliloti*, *Pseudomonas aeruginosa* and *Pseudomonas putida*, where it is replicated and inherited with some stability. The genome of this plasmid was used as a convenient model to study mechanisms of maintenance and heredity of plasmids with a broad spectrum of hosts. All plasmids constructed from pPD6 were mobilized by conjugate pRK2013 plasmid into strains of *E. coli*, *P. aeruginosa* and *A. tumefaciens*, and are suitable for use as cloning vectors, since they have low molecular weight, easily testable characteristics and unique restriction sites which can be transferred and inherited in unrelated gram-negative bacteria. Figures 4, references 30: 6 Russian, 24 Western.

6508/13046
CSO: 1840/647

Nah GENES OF PSEUDOMONAS PUTIDA: MOLECULAR-GENETIC ANALYSIS OF PLASMID pBS286

Moscow GENETIKA in Russian Vol 22, No 11, Nov 86 (manuscript received 18 Dec 85)
pp 2702-2712

[Article by R.V. Tsoy, I.A. Kosheleva and A.M. Boronin, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino-na-Oke, Moscow Oblast]

[Abstract] Data are presented on molecular-genetic analysis of the plasmids NPL-1, NPL-41 and pBS286. The plasmid pBS286 is a deletion derivative of the plasmid NPL-41::TnA and manifests retention of constitutive synthesis of naphthalene deoxygenase and constitutive activity of catechol-2, 3-deoxygenase. It was previously shown that the transition from inducible synthesis of naphthalene deoxygenase to constitutive synthesis is accompanied by inversion of a DNA segment with a length of 4.2 tpn. The data obtained in this work show that the inverted segment is located proximally to the structural gene of the first enzyme of the naphthalene oxidation path, naphthalene deoxygenase, and secondly, this segment is quite close, if not overlapping, with the Sall-I-fragment of pBS286, as well as the R-locus of the NAH plasmid. Figures 6; references 19: 7 Russian, 12 Western.

6508/13046
CSO: 1840/647

NEW VECTOR FOR CLONING GENES AND REPLICONS IN YEASTS

Moscow GENETIKA in Russian Vol 22, No 11, Nov 86 (manuscript received 5 Oct 85)
pp 2728-2733

[Article by M.A. Neystat, M.Yu. Fonshteyn, S.V. Benevolenskiy, N.K. Yankovskiy and I.I. Tolstorukov, All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow]

[Abstract] Sacch. cerevisiae have increasing significance for the microbiological, food and medical industries, being used for cloning of important prokaryote and eukaryote genes. This cloning requires the presence of a shuttle (2-replicon) vector which can effectively transform bacterial and yeast cells and stably replicate in them, a vector containing selective markers and allowing selection of insertions. The purpose of the present work was construction and study of the properties of a shuttle vector for yeasts based on the vector bacteriophage λ 47.1 of E. coli, allowing direct selection of molecules with insertions of 15-24 tpn. The vector λ MAN78 with inserted heterologic DNA is easily isolated as a plasmid from yeast transformants, packed in vitro and supports lytic development of the phage in E. coli cells. A useful property of λ MAN78 is its ability to transform sacch. cerevisiae yeast

cells with high frequency, better than the initial plasmid YRp7. λ MAN78 can also be used to isolate replicons of varying origins in *sacch. cerevisiae*. Figures 1; references 15 (Western).

6508/13046
CSO: 1840/647

UDC 525.24:633.51

CYTOGENETIC EFFECT OF COTORAN AND TOLUINE IN BARLEY CELLS

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 4, Jul-Aug 86 (manuscript received 26 Jul 84) pp 57-59

[Article by A.S. Sultanov and A.A. Abdullayev, Institute of Experimental Plant Biology, UzSSR Academy of Sciences]

[Abstract] Mutagenic activity of cotoran and toluine (0.01, 0.1 and 1% solutions) was studied on barley, a classical model for investigating gene mutations. Experiments were conducted in laboratories and in the field. It was shown that even at low doses cotoran and toluine exhibited mutagenic action. At increased concentrations, the number of anomalous cells was increased and the mitotic activity was depressed. The principal chromosome aberrations were chromatid bridges along with microfragments and deletions. The growth of the plants was markedly diminished and the ripening period was extended. Morphological indices of F_1 generation were changed. References 8: 7 Russian, 1 Western.

7813/13046
CSO: 1840/680

UDC 575.591

SIGNIFICANCE OF MARRIAGE STRUCTURE IN PREDICTING PREGNANCY FAILURE

Moscow GENETIKA in Russian Vol 22, No 1, Jan 86 (manuscript received 18 Dec 84; final version received 29 May 85) pp 158-163

[Article by L.V. Antipenskaya, T.A. Ilyukhina and L.A. Atramentova, Ukrainian Institute for Advanced Training of Physicians, Kharkov]

[Abstract] A study was made of the frequency of exogamous marriages among two successive generations of the Kharkov populace. The frequency of unsuccessful pregnancy in marriages differing in degree of exogamy is studied. The degree of exogamy among the married couples was not found to have any reliable influence on probability of unsuccessful pregnancy related to disruption of fetal-maternal immunologic relationships. References 9: 8 Russian, 1 Western.

6508/13046
CSO: 1840/637

STABILIZATION AND CONTROL OF STATISTICALLY UNSTABLE OBJECTS

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 7, No 5, Sep-Oct 86 pp 50-56

[Article by A.V. Melnikov and A.P. Chernyshev, Institute of Psychology, USSR Academy of Sciences]

[Abstract] This study represents one of the first attempts at a consideration of man-machine interactions involving stabilization and control of a statistically unstable object. The operator's performance was evaluated both in terms of operation efficiency as well as in terms of psychophysiological stress, as such efforts entail considerable sensorimotor demands. In managing unstable machine systems, several constraints become apparent that must be taken into consideration in any attempts at stabilization and control. These include the rate of translocation and trajectory of the object and the range of its dynamic stability. The correlation and adaptability of the operator's psychophysiological potential with respect to these constraints determines, in the final analysis, the efficiency with which unstable objects is controlled and stabilized. Figures 4; references 17: 16 Russian, 1 Western.

12172/13046

CSO: 1840/1043

ADDITIONAL TRAINING IN ENGINEERING PSYCHOLOGY FOR ENGINEERING AND TECHNICAL PERSONNEL

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 7, No 5, Sep-Oct 86 pp 85-94

[Article by A.A. Krylov and M.N. Ilyina, Leningrad State University]

[Abstract] The complexity of man-machine systems has increased the need for a solid foundation in engineering psychology on the part of engineers and other technical personnel and has led to a special program offering courses in engineering psychology at Leningrad State University designed for this contingent of students. Rules for admission and criteria for acceptance are described for this diploma program. The program is practical in nature but does not neglect theoretical foundations. Emphasis is placed on relevance, motivation, skills and efficiency in providing a thorough foundation in engineering psychology. References 10: 8 Russian, 2 Western.

12172/13046

CSO: 1840/1043

RESEARCH PROBLEMS IN DESIGN AND IMPLEMENTATION OF MAN-MACHINE SYSTEMS:
SEMINAR PRESENTATIONS AT MOSCOW HIGHER TECHNICAL COLLEGE IMENI N.E. BAUMAN

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 7, No 5, Sep-Oct 86 pp 163-165

[Article by V.V. Zelentsov]

[Abstract] A seminar held at the Moscow Higher Technical College imeni N.E. Bauman included presentations from some 30 ministries and departments, dealing with the human factor in the design and implementation of man-machine systems. Most of the presentations covered the performance of semiautomatic systems, emphasized the need for more solid mathematical description of the human factor, and were largely theoretical in nature. Considerably less attention was given to the performance of computer operators and the work of design engineers. A seminar such as this emphasizes the need for more attention to be accorded to the problems of engineering psychology at technical educational institutions.

12172/13046
CSO: 1840/1043

PSYCHOLOGICAL ASPECTS OF HUMAN FACTOR ACTIVATION

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 7, No 4, Jul-Aug 86 pp 11-22

[Article by T.S. Kabachenko, Institute of Psychology, USSR Academy of Sciences]

[Abstract] A psychological study was conducted on the activation of the human factor in societal and occupational settings. Using the basic tenets of Soviet psychological teachings, three key factors were identified as being important in the activation of the human factor for greater productivity and efficiency. Three important approaches were identified that predispose to activation, including aspects that impact on the initiation of activity, psychological impact of the environment, and actions that influence the subliminal psychological state. Combined use of the various approaches may be formulated to achieve desired end-effects that benefit society by activation of the human factor. References 21: 19 Russian, 2 Western.

12172/13046
CSO: 1840/1044

SEMI-AUTOMATIC CONTROL SYSTEMS FOR MANIPULATIVE ROBOTS

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 8, No 1, Jan-Feb 87 pp 55-59

[Article by L.V. Spiridonova, Moscow Higher Technical College imeni N.E. Bauman]

[Abstract] Terminal transfer studies [Lomov, B.F., Inzhenernaya Psikhologiya (Engineering Psychology), Moscow, 1977, pp 31-55] were employed in an analysis of semiautomatic control systems for manipulative robots. The analysis was performed with five males, 30-45 years old, required to match indexes on a monitor screen while operating manipulative robots. Analysis of the index-matching patterns demonstrated that of the four movements under study, arm movements up and down were most rapid. The most rapid movement was represented by the 'up' direction, while the 'toward self' movement was the slowest. The analysis also showed that the subjects could be distinguished by responsiveness in a required change in direction of manipulative purposes. In addition, the greater the requirements for accuracy, the greater the psychophysiological stress experienced by the operators. Mathematical analysis of the movement patterns showed that the sum of such parameters are required for assessment of operator performance, since each individual parameters (mathematical expectation, root-mean-square-deviation, time constant) by itself does not provide adequate information for an evaluation. Figures 2; references 5 (Russian).

12172/13046

CSO: 1840/1047

AUTOOPHTHALMOTRAINING FOR FATIGUE PREVENTION IN MICROSCOPISTS

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 8, No 1, Jan-Feb 87 pp 110-112

[Article by L.P. Grimak and A.A. Israyelyan, Institute of Psychology, USSR Academy of Sciences, Moscow]

[Abstract] Autogenic ophthalmic training, using the Shultz method, was employed in the case of 20 industrial workers engaged in microscopic manipulations in order to alleviate visual fatigue. The autogenic training modalities were designed to include special ideosensory and ideomotor exercises based on occupational requirements. Positive results and alleviation of fatigue were obtained in 19 of the 20 workers, ranging in age from 25 to 30 years. Following a course of autogenic training the occupational efficiency of the workers improved by 75%, according to the Weston test. References 6: 5 Russian, 1 Western.

12172/13046

CSO: 1840/1047

PREDICTION OF INDIVIDUAL COMPETENCE FOR OPERATION OF MOTOR VEHICLES

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 7, No 4, Jul-Aug 86 pp 66-72

[Article by N.Ye. Popova, All-Union Scientific Research Institute of Technical Esthetics]

[Abstract] A multifaceted approach was taken to evaluate individual suitability for service as automotive drivers, using a battery of tests designed to evaluate personality characteristics and typological features. The standard techniques of differential psychology (Eysenck questionnaire, Spilberger scale, Stroop test, temperament 'pencil' test, etc.) showed an unambiguous correlation between the affective-cognitive features, information processing, and driving ability. The data presented in the study may provide a starting point for psychological approaches in selection of professional drivers. References 10: 6 Russian, 4 Western.

12172/13046

CSO: 1840/1044

TRAINING AND CERTIFICATION OF HIGHLY QUALIFIED CADRES IN WORK PSYCHOLOGY AND ENGINEERING PSYCHOLOGY

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 7, No 3, May-Jun 86 pp 77-88

[Article by A.P. Chernyshev]

[Abstract] An analysis was conducted on the approved and disapproved dissertations in work psychology and engineering psychology over the preceding 5 years by the All-Union Certification Committee. The primary factors leading to rejection were lack of innovation or lack of applicability to the area of specialization. In many cases these shortcomings were attributable to the failure of the educational institutions to standard requirements established governing advanced-degree work. In conclusion, it appears that more rigorous control needs to be exercised over institutions and scientific councils granting advanced degrees in 'Specialty 19.00.03--Work Psychology and Engineering Psychology.'

12172/13046

CSO: 1840/1052

ROBOTICS RESEARCH: PSYCHOLOGICAL AND RHYTHMIC ASPECTS

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 7, No 3, May-Jun 86 pp 40-51

[Article by A.K. Popov, Institute of Psychology, USSR Academy of Sciences]

[Abstract] A hypothesis is presented concerning the rhythmic parameters of brain function and the origins, organization, and level of intellectual activity. Thus, neuronal generators are identified as the source of cephalic function. This concept is applied to robotics, using models of intellectual function as a foundation for the creation of efficient, multifaceted robotic systems on an analogy basis. The primary difficulties are attendant to the problem of temporal compression and spatial expansion and the translation of this concept into machine systems. References 16: 14 Russian, 2 Western.

12172/13046

CSO: 1840/1052

CORRELATION BETWEEN CONCEPTUAL MODEL OF ACTIVITY, MNEMIC SCHEME AND OPERATOR TRAINING METHOD

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 8, No 2, Mar-Apr 87 pp 92-98

[Article by A.I. Galaktionov and V.N. Yanushkin, Institute of Psychology, USSR Academy of Sciences, Moscow]

[Abstract] An engineering psychology study was conducted on the correlation between the conceptual model of activity, mnemonic schemes and effectiveness of training automatic system operators. The study was conducted with 20 student operators, 20-25 years of age, monitored for 12 days while fulfilling some 800 tasks and problems. Evaluation of the processes involved in the formation and transformation of the subjective image of activity when faced with different mnemonic schemes and training methods showed that, with practice, efficiency is acquired as a result of psychological adaptation. Transformation of the conceptual model of activity to a higher plane of efficiency involves technological, functional and informational components of psychological activity, as well as two auxiliary components--algorithmic and image depiction. Mnemonic schemes used in training that are based on the function-algorithm scheme were found to be more effective than those based on technical and functional schemes. All of the subjects were in agreement that the key factor determining the level of operational activity and decision-making is the quality of information and its analysis. References 3: 2 Russian, 1 Western.

12172/13046

CSO: 1840/1040

UDC 616.98-085.276.4-036.8-07:616.155.3-008.1

EVALUATION OF NONSPECIFIC IMMUNOSTIMULANTS BY LEUKOCYTE MIGRATION INHIBITION TEST

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 7, Jul 86 (manuscript received 3 Dec 85) pp 100-102

[Article by M.N. Aptekareva and L.P. Sviridov, Military Medical Academy imeni S.M. Kirov, Leningrad]

[Abstract] A study was conducted with a capillary leukocyte migration inhibition test to assess its value as an indicator of nonspecific immunostimulation. Outbred mice were pretreated intraperitoneally either with prodigiosan (0.25 mg/kg) or one of two different yeast RNA preparations (100 mg/kg). One day later the animals were challenged intraperitoneally with 100 to 1,000 *Francisella tularensis* cells. Monitoring of the animals over a 7-day period demonstrated that the preparations which reduced mortality by 43%--prodigiosan and one RNA preparation--produced negative test results. The RNA preparation that failed to stimulate nonspecific immunity was accompanied by inhibition of migration, due to multiplication of the pathogen and onset of sensitization. These observations indicate that the leukocyte migration inhibition test may be used as an indicator of the effectiveness of nonspecific immunostimulants. Tables 2; references 10: 7 Russian, 3 Western.

12172/13046
CSO: 1840/617

UDC 612.112.94+612.419.014.2]:612.6]-06:612.438.015.2:577.112

INDUCTION OF DIFFERENTIATION OF PRECURSORS OF T-CELLS OF HUMAN BLOOD AND BONE MARROW BY SYNTHETIC FRAGMENTS OF THYMIC FACTORS

Moscow IMMUNOLOGIYA in Russian No 4, Jul-Aug 86 (manuscript received 21 Dec 84) pp 24-26

[Article by V.F. Martynov, L.I. Leontyeva, Ye.I. Sorochinskaya, I.S. Freydlin, A.S. Tseybakh and I.Ya. Kazhdan, Leningrad University, First Leningrad Medical Institute imeni I.P. Pavlov]

[Abstract] Biological activity of synthetic fragments of thymic factors (thymopoietin (TP-5), α_1 -thymosine and serum thymic factor (STF)) was tested

after synthesis of the pentapeptides by classical peptide chemistry methods. The study used blood from ten healthy donors and bone marrow obtained from four persons with ischemic heart disease. A model system of precursor cells was developed to assess biological activity. All three preparations had the same pronounced differentiating effect on the subjects' blood precursor cells in a wide range of concentration from 10^4 - 10^{-3} ng/ml. The model system of blood precursor cells was found to be completely adequate and highly sensitive for the studying biological activity of synthetic fragments of thymic factors. Figures 3; references 5: 2 Russian, 3 Western.

2791/13046
CSO: 1840/557

UDC 612.112.94.017.1-063:612.419]014.46-615.272:547.962.5

INFLUENCE OF BONE MARROW FACTOR, STIMULATOR OF ANTIBODY PRODUCERS, ON
 3 H-THYMIDINE INCORPORATION INTO LYMPHOCYTES STIMULATED BY PHYTOHEMAGGLUTININ
AND POKEWEEED MITOGEN

Moscow IMMUNOLOGIYA in Russian No 4, Jul-Aug 86 (manuscript received 28 Oct 84)
pp 71-73

[Article by E. Patsakova, A.M. Ivanushkin, Yu.O. Sergeyev and A.A. Zozulya,
All-Union Scientific Mental Health Center, USSR Academy of Medical Sciences,
Institute of Immunology, USSR Ministry of Health, Moscow]

[Abstract] Because the effect of a stimulator of antibody producers (SAP) on the proliferative response of lymphocytes, stimulated by mitogens, is unknown, a study of this effect in an inquiry on lymphocytes of healthy blood donors ranging in age from 22-25 years was conducted. The study showed that SAP inhibits the proliferative response of lymphocytes stimulated by phytohemagglutinin or by the mitogen of pokeweed. Effect of SAP was dose-dependent. An increase of SAP concentration in the medium from 37.5-300 μ g/ml reduced the proliferative response of phytohemmagglutinin by 17-76 percent and the response of lymphocytes stimulated by mitogen of pokeweed by 9-58 percent. The suppressing effect of SAP was statistically reliable at a concentration of 75 μ g/ml or higher. SAP (in concentrations from 37.5-300 μ g/ml) at the level of incorporation of 3 H-thymidine into lymphocytes, not stimulated by mitogens, had no effect on lymphocytes proliferation. It was assumed that the effect of SAP is realized by a mechanism which, reducing the proliferative activity suppresses functioning of the T-suppressors and thus increases antibody production. Figures 2; references 12: 5 Russian, 7 Western.

2791/13046
CSO: 1840/557

DIAGNOSIS MADE BY AN ANTIGEN

Moscow SOVETSKAYA ROSSIYA in Russian 3 Apr 87 p 6

[Article by V. Ogurtsov, Rostov-on-Don]

[Abstract] An interview is reported with Professor of Rostov University, Yekaterina Moskalenko, who explained the principles of recognizing various problems in humans by means of specific antigens. Normally serum tests used for this purpose gave a 20% false reading, she claimed; Ye. Moskalenko has added two more tests which eliminate this difficulty. She used these tests (technical specifications are not mentioned) to screen large numbers of workers at a nearby plant. Abnormal results were observed in 1,600 of them, from which 375 were first identified as having a problem through this screening. In three cases, cancer of the stomach was indicated which after 3 years of observation was confirmed clinically. A large blind evaluation of this test system was done at the Rostov Scientific Research Institute of Oncology. Results will be reported in the near future.

7813/13046

CSO: 1840/698

UDC 612.26+591.150

OXYGEN CONSUMPTION BY BAIKAL SEAL IN FREE SWIMMING AND EFFECTS OF DIVING DURATION

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA in Russian Vol 72, No 8, Aug 86 (manuscript received 15 Jun 84) pp 1113-1118

[Article by Ye.A. Baranov, Ye.A. Petrov, V.I. Baranov and K.A. Shoshenko, Department of Hydrobiology and Systematics of Aqueous Organisms, Limnological Institute, Siberian Department, USSR Academy of Sciences, Irkutsk; Micro-circulation Laboratory, Institute of Physiology, Siberian Department, USSR Academy of Medical Sciences, Novosibirsk]

[Abstract] Oxygen consumption studies were conducted on seven male Baikal seals (14-49 kg) to further assess adaptive mechanisms in this species. In a free swimming situation in a 1.5 x 3 m tank the animals spent 60-90% of the time under water as a result of short (2-4 min) dives. In that mode, oxygen consumption ranged from 8.6 ± 7.01 ml/min/kg for 14 kg seal, to a low of 4.8 ± 2.22 ml/min/kg for a 49 kg seal. Forced, short-term (3-5 min) dives did not affect oxygen consumption, relying on oxygen reserves in the body. However, more prolonged dives (10-20 min in pups, 20-30 min in adults) led to a 2- to 3-fold reduction in oxygen consumption and a considerable oxygen debt. Approximately 50-80% of the oxygen debt is overcome during the first 2-3 min of the recovery phase, while the remainder of the debt requires an additional 10-40 min, depending on the duration of the dive, body weight, and rate of oxidation of anaerobic metabolites. Figures 2; references 20: 8 Russian, 12 Western.

12172/13046
CSO: 1840/795

UDC 615.385.3.014.413

CRYOCONSERVATION OF GRANULOCYTES USING LEUKOCRYODMAC SOLUTION

Moscow GEMATOLOGIYA I TRANSFUZIOLOGIYA in Russian Vol 31, No 12, Dec 86
(manuscript received 5 Jul 85) pp 26-29

[Article by V.A. Agranenko, professor, N.N. Abezgauz, V.M. Troshina, V.A. Martynova, doctor of medical sciences, and G.L. Yermakova, Central Scientific Research Institute of Hematology and Blood Transfusion, USSR Ministry of Health, Moscow]

[Abstract] Dimethylacetamide (DMAA) is a stable cryoprotector. Granulocytes cryopreserved in DMAA require no special procedure for lowering intracellular hyperosmia prior to transfusion. A solution consisting of DMAA, glucose and disodium salt of ethylenediamine of tetraacetic acid (20 ml, 20 g, 0.4 g, respectively, brought up to 100 ml with water) was evaluated as a cryoprotector (trade name "Leykokriodmac"). Freezing procedure was as follows: initial cooling at 3°C per minute, followed by phase transition (2-4 min), then freezing at 5-10°C per minute down to -100°C and storage at -196°C in liquid nitrogen. This procedure assured a long term storage (up to 6 years) of frozen granulocytes. References 8: 3 Russian, 5 Western.

7813/13046
CSO: 1840/686

UDC 616-005.1-036.11-085.384:547.221]-092.9-07:[616.151.4+616.16-008.1

RHEOLOGICAL PROPERTIES OF BLOOD AND STATE OF MICROCIRCULATION DURING EXPERIMENTAL ADMINISTRATION OF PERFLUOROORGANIC COMPOUNDS-EMULSIONS AS BLOOD SUBSTITUTES

Moscow GEMATOLOGIYA I TRANSFUZIOLOGIYA in Russian Vol 31, No 12, Dec 86
(manuscript received 19 Dec 85) pp 29-32

[Article by F.M. Gusenova, U.U. Akhsyanov, V.P. Matviyneko (deceased) and Ye.H. Biryukova, Central Scientific Research Institute of Hematology and Blood Transfusion, USSR Ministry of Health, Moscow]

[Abstract] Blood rheology and its circulation in a microvascular stream was studied experimentally while administering a blood substitute--oxygen carrier

(BSOC)--based on an emulsion of perfluoroorganic compounds (PFC) (20% of a 7:3 emulsion of perfluorodecaline and perfluorotripropylamine) under conditions of acute hemorrhage and plethoric administration of BSOC. Experiments were performed on dogs and rats. It was shown that this method effectively restored rheologic properties of blood and its microcirculation during the crisis times of the first 2 hrs post infusion. When PFC emulsion was used in combination with polyglucin, the effect was substantially prolonged. This appears to be due to normalization of principal hemodynamics parameters. PFC emulsion gave excellent rheological results placing it somewhere between albumin and polyglucin. Side effects included precipitation of thrombocytes in some microvascular segments and increased sensitivity along with lower reactivity of the microvascular walls. These aspects must be considered before mass production of the final agents. Figures 2; references 4 (Russian).

7813/13046
CSO: 1840/686

UDC 615.384.03:616-001.36].012

SYNTHETIC METHODS TO PREPARE COMPLEX BLOOD SUBSTITUTES USED IN SHOCK MANAGEMENT

Moscow GEMATOLOGIYA I TRANSFUZIOLOGIYA in Russian Vol 31, No 12, Dec 86
(manuscript received 28 Jan 85) pp 13-18

[Article by Professor G.S. Levin, Scientific Research Institute of Hematology and Blood Transfusion, UzSSR Ministry of Health, Tashkent]

[Abstract] Infusion therapy is one of the best ways of treating blood loss and shock. A review is presented discussing basic clinical problems occurring during shock and hemorrhages and possible approaches to counteract them. A complex hemocorrector (CHC) was developed on the basis of a colloidal preparation of rheopolyglucin, capable of restoring systemic hemodynamics and normalizing rheological properties of blood and microcirculation. The preparation can be stored for up to 2 years. Steam sterilization (120°C for 20 min) is effective. Rat experiments showed that this preparation, consisting of rheopolyglucin, lactosol, mannite and sodium succinate extended the life of animals in shock by 106 ± 11 min; addition of AK-135 (respiratory modifier) to this mixture extended life by 253 ± 31 min. Figures 1; references 12 (Russian).

7813/13046
CSO: 1840/686

ACCESS TO HEART INTERIOR WITHOUT SCALPEL

Moscow NEDELYA in Russian No 14, 6-12 Apr 87 p 12

[Article by T. Chesanova, Leningrad]

[Abstract] Surgery of arrhythmia is one of the newest advances in medicine. It is based on implantation of electric cardiostimulators which control the abnormalities in heart rhythm (pace makers). The operation is performed without opening the chest wall, by inserting an electrode through a catheter, observing its progress on a TV monitor and implanting a miniature "electro-station" under the chest muscle. The operation lasts 30-40 min. The article leaves the impression that this procedure was developed in the First Leningrad Medical Institute. Soon, ischemic heart disease will be treated surgically at this institution.

7813/13046

CSO: 1840/703

CARDIAC DISEASE AND REMOTE COMPUTER MONITORING

Moscow MOSKOVSKAYA PRAVDA in Russian 14 Apr 87 p 3

[Article by V. Martyanov]

[Abstract] Modern clinics resemble physics laboratories or large computer banks much more than the classical hospitals of the turn of century. A special diagnostic complex for analysis of the performance of an electrocardiostimulator (EKS) system was developed at the All-Union Scientific Center of Surgery, USSR Academy of Medical Sciences (Director B.V. Petrovskiy). EKS's are implanted in patients who have developed cardiac electric conductivity problems. The new diagnostic complex consists of four components: preoperational testing unit, unit for determination of myocardium threshold stimulus (IPRM), monitor for the analysis of EKS system (MARS) and a system of telephone control of EKS parameters (STKS). Using this system it is possible to monitor cardiac patients thousands of miles away as long as they can reach the central office by phone. This helps the local attending physician who can communicate with the center and assures the patient of expert assistance.

7813/13046

CSO: 1840/700

HEART SURGERY IN ARMENIA

Yerevan KOMMUNIST in Russian 13 Jan 87 p 4

[Article by G. Miansaryan, correspondent of "Kommunist"]

[Abstract] Cardiosurgical service in Armenia celebrates its 25th anniversary although the first surgical correction of a heart wound was attempted in 1926, followed by other sporadic attempts at cardiac surgery. In 25 years, progress has been made so that now, even the most complicated heart surgeries are performed. In all, about 30 types of surgeries are performed. Surgeons became more assured of themselves and the patients expect positive outcomes. An important factor in these developments was the organization in Yerevan of a Branch of All-Union Scientific Center of Surgery, USSR Academy of Medical Sciences. Presently, its staff includes 8 doctors of sciences and 41 candidates of sciences. Yerevan became a center for All-Union and international scientific conferences. The normal cardiac surgery team, in addition to surgeons, consists of anesthesiologists, reanimatologists, biochemists, physiologists, immunologists. Rapid developments in anesthesiology have made it possible to operate under hypothermal conditions. Success in immunology led to organ transplants. Three kidney transplants were done last year alone.

7813/13046

CSO: 1840/705

UDC 616.98:578.8]-092:612.017.1-064]-021.5

ACQUIRED IMMUNE DEFICIENCY SYNDROME

[Moscow ARKHIV PATOLOGII in Russian Vol 48, No 10, Oct 86 (manuscript received 21 Jan 86) pp 3-14

[Article by A.I. Strukov and O.Ya. Kaufman, Department of Pathological Anatomy, 2d Medical Faculty, I Moscow Medical Institute imeni I.M. Sechenov]

[Abstract] First place among secondary immunodeficiencies in terms of current interest belongs to acquired immune deficiency syndrome (AIDS) [SPID in Russian] which was first described in the United States. CDC [Atlanta] developed diagnostic criteria for this syndrome. This article reviews published data of predominantly western authors (66/70); surprisingly, no references are made to Gallo or Montagnard. AIDS was described as a low-contagious disease most likely caused by HTLV-III retrovirus which at present is invariably fatal. There are a few typical clinical symptoms. Soviet scientists believe that AIDS is not a new disease but simply one recently recognized as a separate entity due to the progress of virology. Authors have noted high frequency of Kaposi sarcoma among the AIDS patients. Principal cause of death is due to "opportunistic infections." Diagnostic signs include presence of HTLV-III antibodies, changes in lymph nodes, high levels of alpha-tymosin and a drastic reduction of T-lymphocytes in blood. References 70: 4 Russian, 66 Western.

7813/13046

CSO: 1840/689

PHARMORUBICIN THERAPY IN BREAST CANCER

Moscow SOVETSKAYA MEDITSINA in Russian No 10, Oct 86 (manuscript received 16 Dec 85) pp 36-39

[Article by N.Ya. Ass and V.I. Borisov, Moscow Scientific Research Oncological Institute imeni P.A. Gertsen]

[Abstract] Therapeutic trials were conducted with pharmorubicin in the treatment of breast cancer patients. The cohort of patients consisted of 33 subjects ranging in age from 28 to 65 years, treated with a total dose of 60-360 mg/m² pharmorubicin intravenously, at a dose rate of 60 mg/3 weeks. Objective improvements in the form of complete or partial regression of tumor mass were noted in 10 patients (30%). The average duration of regression was 5.7 mos (3-10 mos). In addition, insignificant improvement or stabilization of the clinical process were noted in another 14 (43%) patients, with another 9 patients (37%) presenting with no clinical benefit. Complications of the therapy included leukopenia, gastrointestinal disorders, alopecia and occasional tachycardia immediate following administration of pharmorubicin. References 13 (Western).

12172/13046
CSO: 1840/683

UDC 616.348-006.6-07:616.153.96-097.053.1

CARCINOEMBRYONIC ANTIGEN (CEA) IN CANCER OF LARGE INTESTINE

Moscow SOVETSKAYA MEDITSINA in Russian No 10, Oct 86 (manuscript received 11 Mar 85) pp 39-42

[Article by V.I. Knysh, V.V. Prorokov, Ye.L. Ozhiganov and L.F. Kuznetsova, All-Union Oncological Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] Plasma CEA levels were determined in 519 patients with primary and recurrent malignancies of the large intestine for their diagnostic and monitoring value. The radioimmunoassay results showed a direct correlation between the plasma concentration of CEA and the extent of the neoplasia, with levels in the patients exceeding 5- to 8-fold the levels in control subjects. A correlation of 92.5% was established in the case of postsurgical recurrence and the CEA levels (99.9 ± 9.29 µg/liter), and a 100% correlation with hepatic metastases, the latter accompanied by extremely high CEA concentrations (1,105 to 5,393.5 µg/liter). Elevation of CEA plasma levels was thus correlated with recurrence of the malignancy, indicating the need for confirmatory studies and adjustment of therapy.

12172/13046
CSO: 1840/683

RADIOACTIVE ELEMENTS BY REVERSE ALCHEMY

Moscow IZVESTIYA in Russian 25 Apr 87 p 2

[Article by L. Levitskiy, special correspondent of Izvestiya]

[Abstract] Radioactive thallium 201 is used in diagnosis of early cardiac diseases. However, it is a short-lived, imported isotope which is unavailable in eastern parts of the USSR. In spite of the availability of four gamma chambers in Tomsk, none of them are in use because of the absence of Tl²⁰¹. Local physicists discovered that Tl¹⁹⁹ could also be used effectively for this purpose. Its half-life is somewhat shorter but it can be easily obtained from gold. Basic work was done on animals to show the feasibility of this approach. However, to mass produce it for practical use, a new laboratory with staff of specialists is required. For this, permission has not been granted by the administration. Even though the solution to the problem is at hand, there is no way to resolve this problem.

7813/13046

CSO: 1840/702

UDC 575.591:576.858

HEPATITIS B VIRAL DNA IN HUMAN REPRODUCTIVE CELLS

Moscow GENETIKA in Russian Vol 22, No 1, Jan 86 (manuscript received 22 Mar 85; final version received 8 Jun 85) pp 166-168

[Article by A.K. Naumova, V.I. Korenev, B.V. Leonov, V.V. Tsibinogin and L.L. Kiselev, Institute of Molecular Biology, USSR Academy of Sciences; All-Union Scientific Research Center for Protection of the Health of Mothers and Children, USSR Ministry of Health, Moscow; Institute of Microbiology imeni Avgust Kirkhenshteyn, Latvian SSR Academy of Sciences, Riga]

[Abstract] The authors have previously detected the HBV provirus in the DNA of placental cells of women with neither serologic markers of having had hepatitis, nor clinical symptoms of the disease, indicating the possibility of vertical hereditary transmission of the provirus or a portion of it. In order to determine whether HBV DNA can be present as a provirus in reproductive cells, the authors analyzed DNA preparations isolated from spermatozoa and seminal plasma of 20 males with no clinical signs of hepatitis B. In 6 of 20 cases, HBV was present in DNA preparations isolated from spermatozoa. Previous studies have indicated HBV is present not only in liver cells, but also in other somatic cells. The present work allows the reproductive cells to be added to the list. References 6: 3 Russian, 3 Western.

6508/13046

CSO: 1840/637

UDC 579.8.083.336

IMMOBILIZATION OF MICROORGANISMS ON LATEX FOR PRODUCTION OF ARTIFICIAL FLOCS

Moscow MIKROBIOLOGIYA in Russian Vol 55, No 5, Sep-Oct 86 (manuscript received 18 Mar 85) pp 858-865

[Article by R.M. Aliyeva, A.B. Manasbayeva and A.N. Ilyaletdinov, Institute of Microbiology and Virulogy, KSSR Academy of Sciences, Alma-Ata]

[Abstract] A study of the possibility of artificial flocculation of microorganisms belonging to different taxonomic groups by divinyl styrene latex, determination of factors affecting the flocculation process, development of an optimal flocculation regime, determination of the viability of artificial bioflocs and differences of their structure from the natural aggregated state are described and discussed. Cultures isolated from effluents from organic synthesis enterprises were studied and included microorganisms belonging to Pseudomonas, Micrococcus, Bacillus and Rhodotorula. The flocculation process depended upon several physico-chemical factors but was generally about the same as that which is universal for microorganisms with different taxonomy, morphology and physiology. Structures of the artificial bioflocs were determined by scanning and electron microscopy studies. Figures 5; references 10: 9 Russian, 1 Western.

2791/13046
CSO: 1840/566

UDC 579.841.91.017.7

RESPIRATION OF CELLS AND CELL-FREE EXTRACTS OF HYDROGEN BACTERIUM ALCALIGENES EUTROPHUS

Moscow MIKROBIOLOGIYA in Russian Vol 55, No 5, Sep-Oct 86 (manuscript received 30 May 85) pp 728-731

[Article by Ya.V. Fedorova, Institute of Biophysics, USSR Academy of Sciences, Siberian Department, Krasnoyarsk]

[Abstract] An assessment of the respiratory activity of hydrogen bacteria in different physiological states and in different substrates was presented and discussed. Studies were performed on intact cells and cell-free extracts of

hydrogen-oxidizing *Alcaligenes eutrophus* Z-1, grown in batch and continuous cultures. A gaseous mixture ($O_2+H_2+CO_2$), NADH and sodium succinate served as respiratory substrates for measurement of respiration intensity. The specific respiration rate on the gaseous substrate increased with an increase of culture growth. Specific activities of exogenous and endogenous respiration rate preceding culture growth was proportional. Maximum respiration rate was $0.7 \mu M$ of $O_2/1$ mg of protein/minute during continuous cultivation while endogenous respiration reached $0.2 \mu M$ of $O_2/1$ mg of protein/minute, under these conditions. Respiration rate dropped by 50 percent from the maximum at O_2 concentration of $100 \cdot 10 \mu M$. Acidity of the medium in a wide range of pH did not affect specific respiratory activity. Carbon monoxide and cyanide had relatively little effect on the respiration rate. Figures 6; references 6: 3 Russian, 3 Western.

2791/13046
CSO: 1840/566

UDC 579.841.91.017.7.04

EFFECT OF MEDIA pH ON GROWTH AND PHYSIOLOGY OF HYDROGEN OXIDIZING BACTERIA

Moscow MIKROBIOLOGIYA in Russian Vol 55, No 5, Sep-Oct 86 (manuscript received 23 Apr 85) pp 745-749

[Article by T.G. Volova, G.M. Tereshkova, G.S. Kalacheva and M.V. Salnikov, Institute of Biophysics, USSR Academy of Sciences, Siberian Department, Krasnoyarsk]

[Abstract] The limits of the physiological effect of the pH of the medium for *Alcaligenes eutrophus* Z-1 were determined and the rate of growth, metabolism and morphology of the bacteria at very high and very low pH values were studied. Optimal pH values for growth ranged from 6.5-7.5 pH, with the bacteria reproducing at a rate near maximum (0.4 hr^{-1}). Low rates of reproduction were possible at pH values from 4.0-9.0. Significant changes in metabolism accompanied growth of *A. eutrophus* Z-1 cultures at extreme acid and extreme alkali pH's. Rate of oxidation of the gaseous substrate increased but the utilization efficiency decreased. Growth of bacteria in an acid medium (pH 4.2-5.2) reduced the intracellular nitrogen-containing components concentration and increased the percent of lipids. The pH of the medium affected the fatty-acid composition of the lipids in the hydrogen-oxidizing bacteria significantly. At acid pH's, the intracellular concentration of nitrogen-containing compounds decreased and the lipids content increased. The degree of saturation of the lipids increased in an alkaline medium. Electron microscopy showed changes of morphology of intact cells according to the pH of the medium. Figures 2; references 20: 12 Russian, 8 Western.

2791/13046
CSO: 1840/566

PRODUCTION OF HYBRID FORMS OF YEASTS HANSENULA AND PICHIA BY PROTOPLAST FUSION

Moscow MIKROBIOLOGIYA in Russian Vol 55, No 5, Sep-Oct 86 (manuscript received 24 Apr 85) pp 760-764

[Article by M.A. Abramova and Yu.G. Kapultsevich, All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow]

[Abstract] Production and study of prototrophic products of fusion of protoplasts and demonstration of their hybrid nature are described and discussed based on experiments on yeasts Hansenula polymorpha and Pichia polymorpha. Fusion frequency was 5×10^{-4} . Frequency of spontaneous segregation of auxotrophic markers did not exceed 4.3 percent. Treatment of the hybrid cultures with p-fluorophenylalanine increased the frequency of spontaneous mitotic segregation of the hybrids with an increase in the rate of spontaneous segregation from 4 percent up to 19-25 percent, depending upon the strain involved. The recombinant phenotype appeared in 4-13 percent of the clones. Ultraviolet irradiation (250-300 ergs/cm²) produced no auxotrophic clones. Formation of both parental enzymes of glycerine metabolism (glycerol kinase and glycerol dehydrogenase) further confirmed the hybrid nature of the cultures produced. The hybrids were classified according to their assimilation of carbon. Groups were: 1- hybrids similar to P. polymorpha in their properties, 2- hybrids similar to H. polymorpha in their properties and 3- mixed hybrids. References 13: 1 Russian, 12 Western.

2791/13046

CSO: 1840/566

TWO-CYCLE CULTIVATION OF CHOLERA VIBRIOS IN FERMENTER

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 7, Jul 86 (manuscript received 27 Jul 85) pp 21-24

[Article by P.Kh. Nenkov, N. Strashimirova and A.Ch. Polikar (deceased), Scientific Institute of Infectious and Parasitic Diseases, Medical Academy, Bulgaria]

[Abstract] A multicyclic approach was taken to the cultivation of Inaba and Ogawa strains of cholera vibrio for vaccine preparation, in which an inoculum from one fermenter was transferred into a second fermenter. Using previously described media and techniques, the cells were monitored for cultural behavior, ultrastructure, antigenicity, immunogenicity and biomass yields. There were no significant differences between the cells obtained in the first and second cycles, with the exception that the minimum generation time in the second cycle was reduced to 21 min versus 29 min in the first cycle. Two-cycle cultivation was found to yield cells suitable for preparation of lyophilized and adsorbed cholera vaccines according to WHO standards. Figures 5; references 10: 5 Russian, 5 Western.

12172/13046

CSO: 1840/617

UDC 616.98:578.833.28

WESTERN NILE FEVER

Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 7, Jul 86 (manuscript received 17 Sep 85) pp 110-113

[Article by K.S. Ivanov, Yu.V. Lobzin and V.P. Nikolayev, Military Medical Academy imeni S.M. Kirov, Leningrad]

[Abstract] A case study is presented of a West Nile fever patient, a 23-year-old male, who presented with typical symptomatology upon returning to the USSR from Syria. The case is presented because of the unfamiliarity of Soviet physicians with this entity, and because endemic foci have been identified in Armenia, Azerbaijan, Kazakhstan, Turkmenia, Moldavia and Ukraine, among other regions. The case was confirmed on serological grounds and detailed clinical analysis, consisting of relapsing episodes with high fever and systemic manifestations. Key features of the disease are meningitis, lymphadenopathy, cardiac symptoms, and extensive involvement of the reticulo-endothelial system and of serous membranes. In other patients, periodic relapses have been noted for 15 years and longer. References 20: 11 Russian, 9 Western.

12172/13046

CSO: 1840/617

UDC 577.113/663.71

DESIGNING INTERMEDIATE VECTORS FOR TRANSFER AND EXPRESSION OF HETEROLOGOUS GENES IN HIGHER PLANTS

Baku IZVESTIYA AKADEMII NAUK AZERBAIDZHANSKOY SSR. SERIYA BIOLOGICHESKIKH NAUK in Russian No 3, May-Jun 86 pp 101-108

[Article by A.Z. Muradov and Dzh.A. Aliyev from the Physicochemical Biology Sector of the AzSSR Academy of Sciences; first paragraph, IZVESTIYA AKADEMII NAUK AZERBAIDZHANSKOY SSR. SERIYA BIOLOGICHESKIKH NAUK abstract]

[Text] Genetic engineering methods are used to design recombinant molecules of DNA containing regulator regions of the gene 5' DNA pTi Ach5 of *A. tumefaciens*. In these molecules, the regulator sequences of gene 5 are cloned in the polylinker region of plasmid pUC 19 with a unique site between them. It is proposed that the structural regions of the transferable genes be built in along this site (BamHI). In such "chimeral" DNA molecules the structural regions of the transferable gene are controlled by signal sequences that are recognizable by plant RNA-polymerase II. The systems that have been designed may serve as vectors for the transfer and expression of heterologous genes in the cells of higher plants.

The creation of new high-productivity varieties of cultivated plants that are resistant to various diseases, cold, heat, and the effect of herbicides and pesticides is one of the main tasks facing plant genetic engineers. All of the aforementioned useful properties (as well as others) for cultivated plants are exogenous, i.e., they must be transferred from specified donors. In this context designing effective systems for the transfer and expression of heterologous genes in higher plants is an urgent task of modern molecular plant biology.

The presently existing systems of gene transfer in plants may be unified into several groups: transfer by means of 1) Ti-plasmid *A. tumefaciens* [7, 8, 10, 27]; 2) plant viruses [24]; 3) liposomes [23]; and 4) direct injection of genetic material into the cell [25].

Transfer with the help of the Ti-plasmid *A. tumefaciens* and the design of vectors based on the cloning of its various fragments is the most-studied and most frequently used method of transfer into higher plants.

Agrobacterium tumefaciens is a gram-negative soil bacterium that is

distinguished by its capability of forming tumors and castellate galls in dicotyledonous plants [3, 4, 28]. The presence of cuts and cracks on the plant surface is a necessary condition for the formation of tumors [19]. All pathogenic strains of *A. tumefaciens* contain Ti-plasmid, which is directly responsible for the formation of castellate gall [30]. The molecular mechanism of tumor formation is explained by Ti-plasmid's capability of transferring its specific fragment (T-DNA) to the plant genome where it is covalently built into the plant chromosome [31]. Normal plant cells that have been transformed in this manner are transformed into tumor cells growing in a medium without phytohormones (auxins and cytokinins) [1,2]. The tumors then begin to produce specific compounds--opins--that are heterologous for plants but necessary for the life support of agrobacteria [6, 9, 12]. After being built into the plant chromosome, all T-DNA genes are transcribed with differing effectiveness by the plant RNA-polymerase II [29], with the subsequent formation of poly-(A)+ RNA. The "recognition" by the eukariotic fragments of the bacterial genes is explained by the presence in these genes of eukariotic signals of the beginning and end of the genes (promoters and terminators) [15].

The capability of the Ti-plasmid *A. tumefaciens* to introduce its genes into the plant genome is widely used to design systems for the transfer and expression of heterologous genes into the plant cells. For this, transferable genes must initially be introduced into the T-DNA region of the Ti-plasmid; then these bacteria transform the plant cells. From these a plant in which the introduced gene will "work" may regenerate. However, the effect of this type of system, which has already become classic, is limited to the sphere of dicotyledonous plants. Although opins have been found in certain monocotyledonous plants [14], the majority of those that are important agricultural crops are not sensitive to the effect of *A. tumefaciens*. It has therefore become necessary to find an alternative way of transforming the cells of monocotyledonous plants. The methods of introducing genetic material into plant cells with the help of microinjections [25] and introducing bacterial spheroplasts [26] into plant protoplasts are not widely used because of their labor-intensiveness.

A simple method of directly transferring recombinant DNA into protoplasts (plants in the presence of polyethyleneglycol) is currently being proposed [13]. With the help of this method it is possible to transfer genes into both dicotyledonous (*N. tabacum*) [24] and monocotyledonous (*Triticum monococcum*) [19] plants.

No matter what method of transferring genes into plants is used, it must be preceded by a complex genetic engineering operation to construct vectors--chimeral structures--in which the structural part of the gene being transferred is controlled by signal sequences that can be recognized by plant RNA-polymerase II. This article deals with creating such effective vectors for the transfer and expression of a heterologous gene into higher plants.

Plasmid DNA was isolated and purified according to the rapid lysis method [20]. This was following by the chromatographic separation of DNA from RNA on a column with Biogel A-150. Restriction was carried out in a 20 mcl volume (14 mcl H₂O + 1 mcl enzyme [1 atomic unit] + 2 mcl restriction buffer [10x] +

1 mcl RNase + 1 mcl DNA [0.5 mcg]) for 1 hour at 37 degrees C. The preparative restriction of the DNA was done in a volume of 100 to 150 mcl restriction medium. The DNA fragments were isolated by the methods of horizontal electrophoresis in agarose gel (0.7 percent gel, Tris-acetate buffer, 80 to 100 V) and vertical electrophoresis in polyacrylamide gel (5 percent gel, Tris-borate buffer). The DNA was stained with ethidium bromide (10 mg/ml). The fragments were eluted from low-melting agarose and polyacrylamide gel according to the method described in [20]. The vectors pBR 322 and pUC 19, which were preliminarily split along a unique site and dephosphorylated with alkaline phosphatase, were used in the experiment. The component cells were transformed according to the method in [20]. The *E. coli* strains K802 and delta M15F- were used. The recombinant colonies were selected by seeding the cells in a medium with ampicillin and tetracycline (for the K802) and in a medium with X-gall and IPTG (for the pUC 19) (the recombinant clones were white, and the wild ones were blue). The primary structure of the DNA fragments was determined according to the method of Maxam and Gilbert [21].

The octopinic Ti-plasmid Ach 5 *A. tumefaciens* was used as the object of study. It is widely known that there are eight transcripts in the structure of T-DNA pTi Ach 5 [Figure 1]. Transcripts 1 and 2 are responsible for synthesizing auxins (tms), transcript 4 for synthesizing cytokinins (tmr), 6a for secreting octopin, and gene 3 for synthesizing octopin [22]. The function of transcripts 5, 6b, and 7 is unclear. In this context it is interesting to study the functions of these genes and construct vectors for the expression of heterologous genes in plant cells by using the genes' signal sequences.

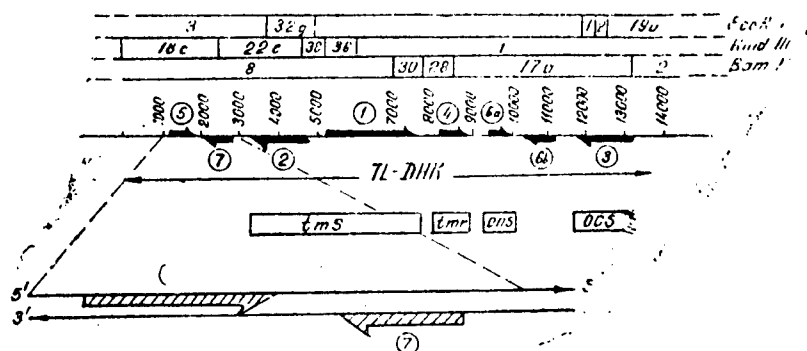


Figure 1. Restriction map of T-DNA of octopinic Ti-plasmid pTi Ach 5. Directions of the genes are indicated by arrows: *fms* and *tmr* are the loci responsible for the formation of radicle and shoot, and *ocs* is responsible for the synthesis and secretion of octopin (explanations are in the text)

Figure 2 presents the primary structure (5' --> 3') of both transcripts with the noted eucariotic signal sequences that control these genes. The positions of these signals are presented in Table 1.

Table 1. Eukariotic Signals in the 5' --> 3' Sequences of Genes 5 and 7

(1) Ген	«CCAAT	(2) Пози- ция	«TATA»	(2) Пози- ция	(3) Поли- (A,+)	(2) Пози- ция	(4) Первый ATG- кодон
5	GGCgAAT acgCAAT taCCAAT GGCCAAT CTTCCAT	908 935 979 1001 2808	AATAATA TATAAgA TTTATAT TATATAT	983 1012 1029 2735	AATAAT AATAAT AATAAA	1912 1948 2188	1060 2687

Key:

1. Gene
2. Position
3. Poly- (A, +
4. First ATG-codon

As in all eukariotic genes, the TATA sequence in transcripts 4 and 7 of T-DNA pTi Ach 5 is located at a distance 25 to 30 pn before the start of the ATG-codon and is a signal for the RNA. The other signal sequence--CCAAT--is located 40 to 50 pn from TATA and regulates the transcription of the eukariotic genes. Three sequences--AATAATA, TATAACA, and TTTATAT (positions 983, 1,012, and 1,029, respectively)--are located in the 5'-untranslatable region of gene 5. Four regulator signals--GGCGAATAT (position 909), ACGCAATA (935), TACCAATAA (979), and GGCCATTTA (1,001)--precede these signal sequences. Transcript 7 has one signal sequence that is homologous for TATA and one for CCAAT. These are TATATAT (2,737) and CTCAAGCT (2,800).

The majority of eukariotic genes are polyadenylated. The polyadenylation signals are located on the 3'-terminals of the genes. In transcript 5 there are two joining regions--poly-(A)+ positions 1,912 and 1,948. These are located 172 and 208 pn from the stop codon. The polyadenylation position for gene 7 is 2,188.

As in all eukariotic genes, the first ATG-codon in transcripts 5 and 7 is an initiating gene. The second ATG-codons are located 300 pn (for gene 5) and 231 pn (for gene 7) from the first.

Based on the aforementioned facts, it is possible to assert that despite their bacterial nature, transcripts 5 and 7 of T-DNA pTi Ach 5 A. tumefaciens are controlled by eukariotic signal sequences--promoters and terminators. When constructing vectors for the transfer and expression of heterologous genes in plant cells it is necessary that the promotor regions of the T-DNA genes into which the aforementioned regulator signals will be placed be "fastened" to the structural region of the gene being transferred. Figure 3 presents a strategy for designing "chimeral genes" containing regulator regions of gene 5 T-DNA pTi Ach 5.

Plasmid pGV 0153 [11], in which the BamHI fragment of T-DNA pTi Ach 5 was cloned into pBR 322, was used as a stock material. The splitting of this plasmid by the HindIII restrictase results in the formation of the following six fragments: 1) 4,981,000 pn (pBR322+HindIII-I fragment); 2) 2,800,000 pn (HindIII-18c fragment); 3) 2,110,000 pn (HindIII-22e fragment); 4) 695 pn

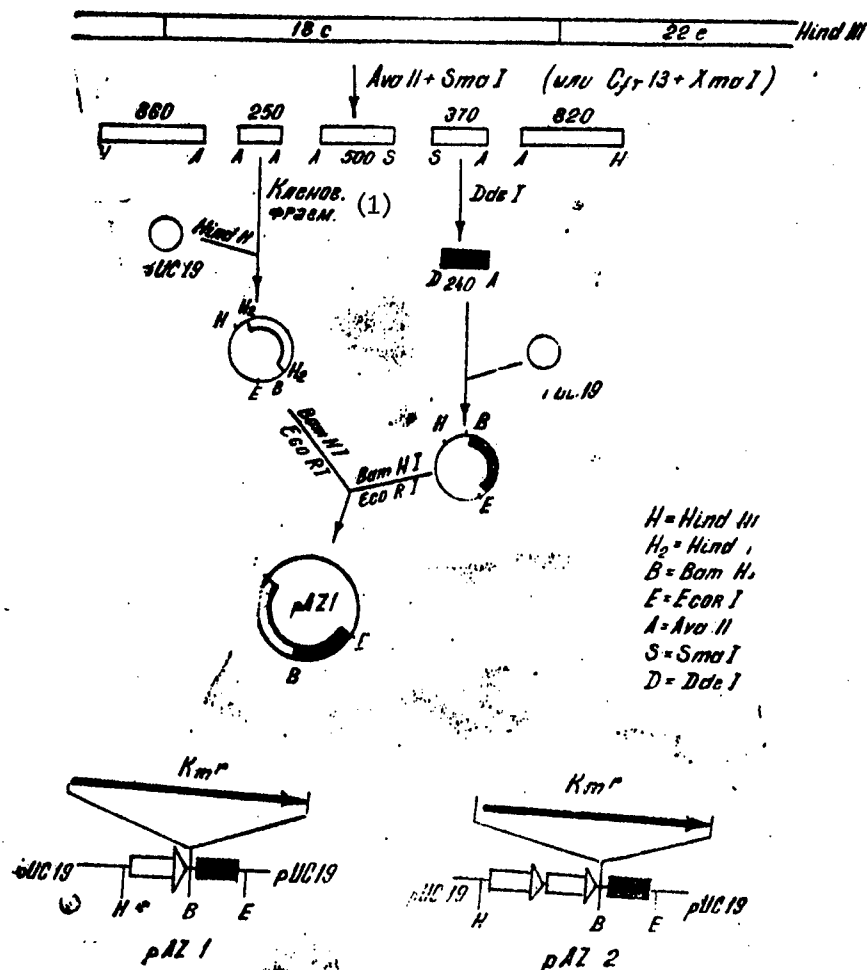


Figure 3. Strategy for designing vectors based on closing of the regulator sequences of gene 5 T-DNA pTi Ach 5

(HindIII-36b fragment); 5) 430 pn (HindIII-38c fragment); and 6) 343 pn (fragment pBR322). The fragment HindIII-18c is necessary for further work. After the preparatory electrophoresis in horizontal agarose gel (low-melting agarose gel manufactured by Sigma) is conducted, the bands corresponding to the HindIII-18c fragment were cut out. After the fragment was eluted and purified, it was cloned in pBR322 that was presplit along the HindIII site and treated with alkaline phosphate. Calcium E. coli cells of the strain K802 were used to transform the recombinant DNA molecules obtained (pIX 1-3, Table 2). The recombinant clones were selected on the basis of their phenotypic sensitivity to tetracycline (Tc^s) and resistance to ampicillin (Ap^r). Figure 3 presents a strategy for further work. The HindIII-18c fragment was split with the restrictases Cfr13 and Xma I. Five fragments were obtained: 1) 860 pn (Cfr13-1 fragment); 2) 820 pn (Cfr13-HindIII fragment); 3) 500 pn (Cfr13-Xma I); 4) 370 pn (Xma I-Cfr13); and 5) 250 pn (Cfr13-2 fragment).

Table 2. List of Plasmids Obtained

(1) Плазмиды	Устойчивость (2) к антибиотикам	(3) Характеристика
pIX 1	Ap ^r	HindIII-18c фр. pTiAch5 в pBR322
pIX 2	Ap ^r	HindIII-2e фр. pTiAch5 в pBR322
pIX 3	Ap ^r	HindIII-36b фр. pTiAch5 в pBR322
pJA 1	Ap ^r	Cfr13-1 фр. HindIII-18c в pUC 19
pJA 2	Ap ^r	Cfr13-HindIII фр. HindIII-18c в pUC 19
pJA 3	Ap ^r	Cfr13-XmaI фр. HindIII-18c в pUC 19
pJA 4	Ap ^r	XmaI-Cfr13 фр. HindIII-18c в pUC 19
pJA 5	Ap ^r	Cfr13-2 фр. HindIII-18c в pUC 19
pJA 6	Ap ^r	(6) Тандем Cfr13-26 pUC 19
pAZ 1	Ap ^r	HindIII-BamHI фр. pJA 5 и BamHI-EcoRI фр. pJA 4 в pUC 19
pAZ 2	Ap ^r	HindIII-BamHI фр. pJA 6 и BamHI-EcoRI фр. pJA 6 в pUC 19
pHZ 1	Ap ^r	HindIII-23 фр. pTiC58 в pBR 322
(7) Ap — ампицилин.		

Key:

- | | |
|------------------------------|-------------------|
| 1. Plasmids | 4. Fragment |
| 2. Resistance to antibiotics | 5. Intc |
| 3. Characteristics | 6. Tandem |
| | 7. Ap, ampicillin |

To dull the "adhesive" ends of all five fragments, they were treated with DNA-polymerase Klenov fragment. Next, these fragments were ligated with vector pUC 19, which was presplit along the dull HindII site. The F delta M15 cells were transformed by the recombinant DNA molecules obtained (pJA 1-6, Table 2). After the cells were seeded in a medium with ampicillin, X-gall, and IPTG, the white colonies were removed (the wild colonies were blue). The plasmids obtained--pJA 5, pJA 4, and pJA 6--contain fifth-transcript promotor and terminator regions. All four CCAAT and three TATA signal sequences are included in the structure of the Cfr13-2 fragment. In addition, the fragment contains the first 50 nucleotides of the structural region of gene 5.

The remainder of the experiment consisted of recloning the HindIII-BamHI fragments from pJA 2 and pJA 6 into pUC 19 that was presplit by the specified rescriptases with subsequent cloning of the terminator region (BamHI-EcoRI) into the same plasmid.

The recombinant DNA molecules obtained--pAZ 1 and pAZ 2--contain the promotor and terminator regions of gene 5 with a unique BamHI site between them. Along this site it is possible to clone the structural regions of various genes that have been proposed for transfer into plants.

The type pIX 1-3, pJA 1-6, and pHZ 1 plasmids containing the HindIII-23 fragment of nopalinic pTiC58 A. tumefaciens that have been constructed can be used as intermediate vectors, and the plasmids pAZ 1-2 can be used as direct vectors for the transfer and expression of heterologous genes in the cells of higher plants. From the plant cells that have been transformed by these plasmids it is possible to regenerate an entire plant in which the introduced

gene will "work."

The authors thank K.G. Skryabin, professor and head of the Plant Genetic Engineering Laboratory of the Molecular Biology Institute of the USSR Academy of Sciences, and V. Zakharyev, senior scientific associate, for their making it possible to conduct the work described here using their laboratory as a base.

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CSO 1840/773

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NATURE OF HEME-NONAPEPTIDE AGGREGATION IN AQUEOUS SOLUTION

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 20, No 2, Mar-Apr 86 (manuscript received 4 Jun 85) pp 502-513

[Article by A.M. Arutyunyan, S.A. Surkov, V.A. Luchkov, A.I. Lysko, A.F. Mironov*, V.D. Rummyantseva* and R.P. Yevstigneyeva*, Scientific Research Institute of Biological Testing of Chemical Compounds, Kupavna, Moscow Oblast, *Moscow Institute of Precision Chemical Technology imeni M.V. Lomonosov]

[Abstract] Methods of circular dichromism, magnetic circular dichromism and spectrophotometry were used to study the spin valence state and mechanisms of interaction of heme-nona peptide (HNP) molecules in solution in order to explain conditions and methods of their aggregation. HNP was obtained by tryptic hydrolysis of cytochrome c from horse heart. Ferri-HNP in the concentration range of 0.25-12.5 μM and ferro-HNP in the concentration range of 1-25 μM and temperature range of 0-50°C and neutral pH appeared in two states of equilibrium (monomeric and aggregated dimeric states). The iron ion of the monomeric HNP appeared in pentacoordinated high-spin state. Aggregation occurred because of formation of a coordination bond of the ϵ -amino group of Lys-22 of one HNP molecule with an iron ion of a second molecule of HNP. The iron ion in such dimers appeared in a high-spin pentacoordinated state while the second molecule of HNP was in a low-spin hexacoordinated state. The planes of hemes of both molecules were parallel at a distance of about 10 Å. Equilibrium between the two states of aggregation of the HNP molecules depends upon the concentration, temperature and pH. Increase of HNP concentration or shift to alkaline pH changed the aggregation mechanism. Figures 8; references 11: 8 Russian, 3 Western.

2791/13046

CSO: 1840/568

DETECTION OF HEME-HEME INTERACTION IN CIRCULAR DICHROMISM SPECTRA

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 20, No 2, Mar-Apr 86 (manuscript received 4 Jun 85) pp 514-518

[Article by A.M. Arutyunyan and A.N. Denisenko, Scientific Research Institute of Biological Testing of Chemical Compounds, Kupavno, Moscow Oblast]

[Abstract] A theoretical calculation of circular dichromism spectra of heme peptides in monomeric form and in different aggregated states is presented and discussed. A semiquantitative explanation of circular dichromism spectra of heme nonapeptide in different forms of aggregation is presented by use of the simple Simpson model of heme within the theory of optical activity by Kirkwood and Tinoco. References 16: 5 Russian, 11 Western.

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STRUCTURE OF THERMUS THERMOPHILUS RIBOSOMES. PART 1. METHOD OF ISOLATION AND PURIFICATION OF RIBOSOMES

Moscow MOLEKULYARNAYA BIOLOGIYA in Russian Vol 20, No 2, Mar-Apr 86 (manuscript received 23 Jun 85) pp 519-526

[Article by Z.V. Gogiya, M.M. Yusupov and T.N. Spirina*, Institute of Protein Research, USSR Academy of Sciences, Pushchino, Moscow Oblast, *Institute of Molecular Genetics, USSR Academy of Sciences, Moscow]

[Abstract] A new method of isolating and purifying ribosomes from *T. thermophilus*, strain HB-8, is described and discussed. The method made it possible to produce ribosomal preparations, free from cell membranes but active in translation. Analysis in an analytical ultracentrifuge showed the sedimentation coefficients of ribosomes, ribosomal subunits and ribosomal RNA of *T. thermophilus* and *E. coli* to be equivalent. This permitted their use for study of the ribosomal proteins by two-dimensional electrophoresis. Analysis of ribosomal dissociation as a function of Mg^{2+} concentration showed the ribosomes to be heterogeneous in capacity for dissociation. The heterogeneity was attributed to a change in structure of some of the subparticles without affecting their sedimentation coefficients. *T. thermophilus* ribosomes can efficiently synthesize polyphenylalanine in the presence of pol(U). An optimum ratio of components of a complete cell-free system of translation was selected. Figures 4; references 19: 5 Russian, 14 Western.

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CSO: 1840/568

UDC 615.246.9.033.07+616-008.949.4:615.246.9

TRANSPORT AND METABOLISM OF MEMBRANE-ACTIVE CHELATING AGENT IN MICE

Moscow VOPROSY MEDITSINSKOY KHIMII in Russian Vol 33, No 1, Jan-Feb 87

[Article by Ye. K. Plotnikova, N. Ya. Golovenko, V. G. Zinkovskiy, N. G. Lukyanenko, O. V. Zhuk, S. S. Basok, Physicochemical Institute imeni A. V. Bogatskiy of the UkSSR Academy of Sciences, Odessa]

[Text] The separation and study of membrane-active properties of naturally derived chelating agents have made the modification of their molecules feasible, as well as the production of new synthetic analogs: crown-ethers [kraun-efiry in Russian], cryptands [kriptandy in Russian] and others [1]. Most of these substances transport cations through biological membranes according to the electric potential gradient. Such iontophoric properties of the macroheterocyclics provide the potentiality for using them as instruments in the study of biomembrane functions, as well as assuming their use as biologically active substances.

The crown-ethers with the pharmacophoric groups (for example, amino acids, peptides and others) are of special interest because the action of the "traditional" biologically active substances, comprising these groups, may be potentiated by facilitating their transport through the histohematic barriers and cell membranes. The synthesis of numerous crown-ethers and their analogs, as well as the study of their pharmacological properties, has shown that these compounds have immunomodulating properties with stimulation mostly of cellular reactions [2, 3], expressed by anticonvulsive activity with ankyrotic and antihypoxic effects [5], and also nootropic action [4]. However, the processes of transport, metabolism and excretion of experimental animals have not been studied at all for the membrane-active macroheterocyclics.

We synthesized tagged N-(³H-aminoacetyl)-1-aza-4,7,10,13-tetraoxacyclopentadecane hydrochloride (ATCH) to study the distribution of characteristics of the polyfunctional macroheterocyclics and their metabolites in the organs and tissues of mice.

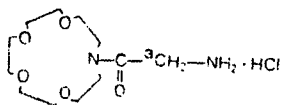


Fig. 1. Chemical formula of ATCH.

This compound, as shown by the formula (Fig. 1), represents an acyl derivative of the membrane-active chelating agent (aza-15-crown-5), which contains glycine residue as a pharmacophoric fragment substituent.

METHODS

The experiments were conducted on nonpedigreed male mice weighing 18-22 g. A membrane-active macroheterocyclic with a specific radioactivity of 0.04 c/mol was administered to the animals intravenously and perorally in a 100 mg/kg dose. After 2, 5, 10, 20 and 30 minutes, as well as after 1, 2, 4, 6, 12 and 24 hours, the animals were decapitated and the organs and tissues were removed. Samples of blood plasma and homogenates (1:5) in the amount of 0.3 ml were dissolved in an 8 ml Triton-X-100 toluol scintillator and the total radioactive material content was determined. The amount of protein-bound free metabolites was determined and a radiochromatographic analysis of the metabolites was also made according to earlier suggested methods [6, 7].

The radioactivity was measured on a LC-100C Beckman instrument with external and internal standardization of the samples. The experimental data were analyzed algorithmically [8, 9].

RESULTS AND DISCUSSION

Investigation of the total radioactive material distribution in the organs and tissues of the mice with intravascular administration of ATCH showed rapid entry of the substance into the organs and tissues (Table 1). Maximum radioactivity was recorded after 2 minutes. The highest levels of ^3H -products were found in the kidneys, liver, blood plasma and spleen of the animals. The kinetics of ATCH content and its metabolites in the indicated organs and blood plasma of the mice is biexponential (Fig. 2). The rapid phase was observed from 2 to 30 minutes in the intervals of the investigation. During this period the drop in ATCH concentration reaches 0.15 of the initial radioactivity level in the blood plasma, 0.17 in the kidneys and 0.27 in the liver. The constant rates of the elimination process equal respectively: 3.9, 3.5 and 2.6 hr^{-1} . The rapid phase of ATCH is practically unnoticed in the animal brain, and the lowest concentrations of the substance were found in the fat and lung tissues of the mice. We did not find any organ or tissue that functioned as a "depot" for the membrane-active chelating agent.

With peroral administration of ATCH its content in the organs and tissues is found to be considerably lower (due to the absence of a rapid distribution phase) than with intravenous administration (Table 2). Such a regularity is characteristic of many medicinal substances.

Earlier, it was shown [6] that ATCH in mice is subject to intensive metabolism. The basic metabolites of ATCH, found in the urine, represent free derivatives that are chloroform-extractable. Considering this fact as well as the fact that in the liver cells enzymes are found, catalyzing the metabolic conversions of xenobiotics, we studied some aspects of ATCH distribution and exchange in this organ. Similar investigations were conducted in the blood plasma for purposes of comparison.

Table 1. ^3H -Product Content₃(in pulses·min⁻¹·hr⁻¹·10³) in Organs and Tissues of Mice After Intravenous Administration of $^3\text{ATCH}$ ($M \pm m$; $n=6$)

Organ	Time after administration									
	minutes					hours				
	2	5	10	20	30	1	2	4	6	21
Liver	13 100 ± 562	11 500 ± 802	9 200 ± 625	5 480 ± 562	4 400 ± 1 050	2 300 ± 690	1 760 ± 366	890 ± 445	1 840 ± 942	990 ± 147
Plasma	13 300 ± 985	6 670 ± 578	3 800 ± 191	3 040 ± 291	1 800 ± 176	1 260 ± 123	1 760 ± 936	1 010 ± 517	787 ± 162	501 ± 44
Brain	1 980 ± 481	5 500 ± 2 590	1 400 ± 464	908 ± 153	2 620 ± 879	1 290 ± 675	1 810 ± 445	1 080 ± 240	980 ± 324	2430 ± 1200
Spleen	2 990 ± 936	5 100 ± 2 340	3 270 ± 648	2 680 ± 929	3 850 ± 1 300	3 080 ± 1240	1 916 ± 610	1 900 ± 1 060	1 920 ± 515	1223 ± 572
Muscles	4 540 ± 1 200	3 220 ± 410	3 030 ± 135	3 170 ± 168	2 030 ± 170	1 440 ± 243	743 ± 134	196 ± 30	275 ± 51	240 ± 73
Kidneys	26 200 ± 1 670	17 100 ± 2 070	13 200 ± 1 380	8 840 ± 1 940	6 420 ± 1 820	3 010 ± 543	1 530 ± 180	1 380 ± 481	1 360 ± 188	947 ± 180
Lungs	2 700 ± 600	1 370 ± 595	1 150 ± 219	497 ± 167	185 ± 66	73 ± 53	200 ± 40	100 ± 20	70 ± 10	—
Heart	3 520 ± 348	3 170 ± 526	2 310 ± 144	1 370 ± 170	747 ± 80	352 ± 145	113 ± 52	373 ± 433	355 ± 123	747 ± 606
Fat	3 970 ± 2 500	2 015 ± 438	2 220 ± 546	3 700 ± 1 440	1 280 ± 110	2 240 ± 770	50 ± 10	300 ± 140	140 ± 40	90 ± 70

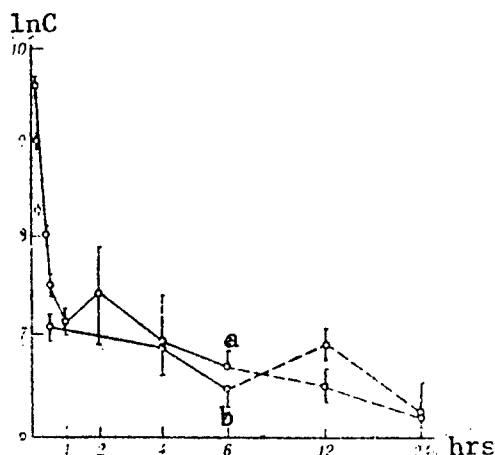


Fig. 2. ^3H -product content as a function ($\ln C$) of time in the blood plasma of mice following intravenous (a) and peroral (b) administration of ATCH (100 mg/kg).

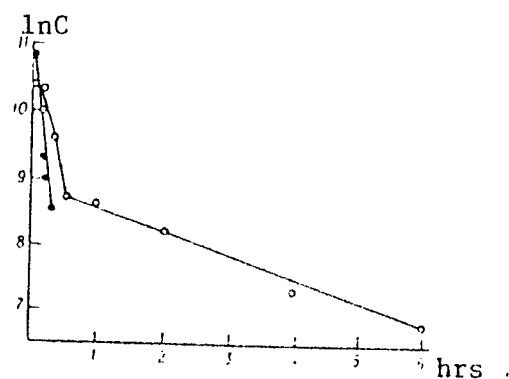


Fig. 3. ATCH free metabolite content in pulses/min in the blood plasma (black dots) and brain (white dots) of mice as a function of time (hrs) after intravenous administration of the compound.

We worked out methods [6] for the comparison that enabled us to quantitatively (95%) extract and divide the ATCH, as well as its free, water soluble and protein bound metabolites.

A reliable presence of ATCH free metabolites, determining the rapid distribution phase of the kinetic scheme, in the blood plasma was reported only in the interval from 2 to 30 minutes of the experiment (Fig. 3.). Their concentration rate dropped at a constant rate of 7.9 hrs^{-1} ($T_{0.5}=5.3$). The drop of ATCH and its free metabolites in the liver is biphasic. The kinetics of ATCH content and its free metabolites during the first 6 hrs takes place according to the formula:

$$C (\text{pulses} \cdot \text{min}^{-1} \cdot \text{hr}^{-1}) 10^3 = 28.9e^{-4.27t} + 8.4e^{-0.39t}$$

Table 2. ^3H -Product Content₃ in the Organs and Tissues of Mice After Peroral Administration of ^3H -ATCH (100 mg/kg)

Organ	Time after administration, hrs				
	0.5	4	6	12	24
Liver	2 030 ± 160	2 100 ± 850	2 010 ± 680	2 000 ± 1 130	1 340 ± 550
Plasma	1 200 ± 200	986 ± 245	750 ± 93	988 ± 155	500 ± 120
Brain	344 ± 137	440 ± 440	436 ± 144	460 ± 61	275 ± 132
Spleen	443 ± 162	273 ± 116	150 ± 11	190 ± 64	380 ± 280
Muscles	517 ± 103	399 ± 130	275 ± 150	960 ± 520	508 ± 95
Kidneys	1 240 ± 214	1 060 ± 115	380 ± 91	340 ± 50	410 ± 100
Heart	275 ± 75	130 ± 119	—	220 ± 220	580 ± 580
Fat	190 ± 70	333 ± 164	320 ± 120	780 ± 780	40 ± 40

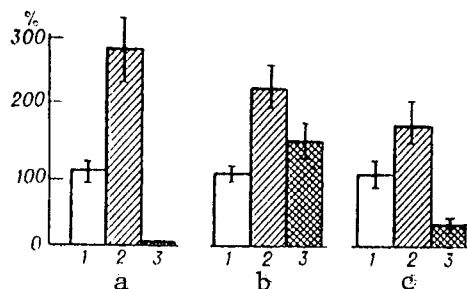


Fig. 4. Relative content (in % of blood plasma) of ³H-products in blood plasma (1), liver (2) and brain of mice 30 min after animals were injected with glycine (a) as well as after intravenous (b) and peroral (c) administration of ATCH.

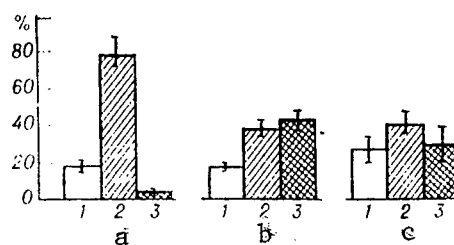


Fig. 5. Relative content (in % of total radioactivity) of ³H-products in chloroform extracts (1), water phase (2) and protein fraction (3) of mouse liver homogenates (1:5) 30 min after injection of mice with glycine (a) as well as intravenous (b) and peroral (c) administration of ATCH.

The distinguishing feature of this distribution scheme is the high value for the calculated magnitude of constant elimination ($k=1.3 \text{ hr}^{-1}$) and this presupposes intense involvement of the macroheterocyclic free derivatives in further biotransformation.

Also, the high content of water soluble and protein bound derivatives of the macroheterocyclic in the liver is of interest. A stationary concentration of the indicated derivatives was reached as early as 0.17 hrs after intravenous administration of ATCH and remained for 24 hrs.

The amount of water soluble and protein bound ³H-derivatives was similar in both variants of administration.

The presence of significant amounts of ATCH metabolites in the protein composition of the liver, as well as in its water soluble derivatives, allows us to compare the distribution nature of the macroheterocyclic under study with similar indicators for glycine administration to animals.

Fig. 4 shows the relative content of ³H-products in the blood plasma, brain and liver of mice 30 min after intravenous and peroral administration of ATCH and ³H-glycine in equimolar doses.

ATCH administration leads to the formation of significant quantities of ³H-products, bound with proteins of the liver. Their concentration reliably exceeds ($P<0.05$) the content of the liver bound protein radioactivity, found after ³H-glycine administration to the animals (Fig. 5).

The presented data and the results of a supplementary series of ^{studies} proved that after ATCH administration the glycine in the liver and blood plasma of mice is not found in the form of a free metabolite. On this basis, we may assume that glycine is not an ATCH metabolite. Glycine is also not found in the chloroform

extracts of mouse urine and feces after administration of the macroheterocyclic [6].

Therefore, the distribution kinetics of ATCH in mice is characterized by a biphasic drop of its content in the absence of an accumulation, and also by intensive metabolism and exchange between the blood plasma and organs.

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DEPTH PERCEPTION AND STRUCTURE OF STEREOANALYZER

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 7, No 4, Jul-Aug 86 pp 104-114

[Article by G.G. Vaytkyavichyus, V.K. Mildazhis and V.P. Pyatrauskas]

[Abstract] Psychophysical methods were employed in analysis of the binocular disparity detector as an approach to structural evaluation of depth perception analyzer. Analysis of depth perception in relation to image brightness on the two retinas confirmed the fact that the human analyzer consists of two linearly-independent primary detectors. The possibility of a subjective drift in depth perception was also raised, based on a more rapid loss of sensitivity in the more strongly stimulated detector. Figures 2; references 22: 2 Russian, 20 Western.

12172/13046

CSO: 1840/1044

UDC 612.015.348

EFFECTS OF ANGIOTENSIN-II AND cAMP ON CORRELATION OF INTRAVITAL REDOX DYNAMICS WITH ELECTRICAL ACTIVITY OF NEURONS

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOV in Russian Vol 72, No 10, Oct 86 (manuscript received 11 Nov 85) pp 1378-1382

[Article by V.V. Sherstnev, M.O. Samoylov, V.P. Nikitin, D.G. Semenov and I.A. Svetlayev, Laboratory of Molecular Neurophysiology and Biochemistry, Scientific Research Institute of Normal Physiology imeni P.K. Anokhin, USSR Academy of Medical Sciences, Moscow; Laboratory of Neuronal Functional Morphology and Physiology, Institute of Physiology imeni I.P. Pavlov, USSR Academy of Sciences, Leningrad]

[Abstract] Studies were conducted with sensorimotor cortical neurons of cats and rabbits to assess the effects of microionophoretic application of angiotensin-II (A-II) or of cAMP on the intravital correlation of electrical behavior and redox dynamics. The data showed that 83% of the 122 neurons tested were responsive to A-II. The response consisted of activation of discharge activity in 63% of the cases, inhibition in 22%, and a variable response

in the case of 15% of the cells. Application of cAMP to 158 neurons resulted in a response rate of 80%, with 72% of the neurons showing a depression of the discharge rate and 8% enhanced activity. Analysis of changes in intracellular reducing equivalents revealed that A-II induced an increase in 46% of the cells by 20-30%, while cAMP induced an increase in 85% of the cells by 10-17%. These observations revealed general similarities between the effects of A-II and cAMP, as well as differences. In general, there was no direct correlation between the induced electrical and metabolic changes. A-II appears to act through cAMP, as well as through other mechanisms. Figures 2; references 15: 11 Russian, 4 Western.

12172/13046
CSO: 1840/796

UDC 612.111+599.323.4

EFFECTS OF HYPEROXIA ON HEMOGLOBIN OF LABORATORY

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOV in Russian Vol 72, No 10, Oct 86 (manuscript received 1 Aug 83) pp 1402-1405

[Article by L.I. Irzhak and V.I. Tayurskiy, Chair of Human and Animal Physiology, State University imeni 50-Letiya SSSR, Syktyvkar]

[Abstract] An analysis was conducted on functional changes in hemoglobin induced by hyperoxia, using a model system of male and female outbred mice (15-30 g) placed in an hyperoxic environmental chamber for 1 or 3 hours. Hemoglobin derived from the hyperoxic mice exhibited increased affinity for oxygen and a higher buffering capacity. Other concomitant changes included a decrease in the pK value, in the dissociation cooperativity, and in the heat of ionization (ΔH). The changes were more pronounced in hemoglobin derived from mice exposed to hyperoxia for 3 hours than in the mice exposed for 1 hour and suggested environmentally-induced immobilization of the hemoglobin molecule in a conformation showing higher affinity for oxygen. Figures 3; references 9 Russian, 4 Western.

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CSO: 1840/796

EFFECTS OF HIGH TEMPERATURES ON HUMANS

Frunze ZDRAVOOKHRANENIYE KIRGIZII in Russian No 3, May-Jun 86 pp 11-13

[Article by A.A. Dzhaylobayev, K.A. Arbayeva, Ye.I. Bartashchuk, N.Ya. Yusupova, B.Ya. Grinshteyn, S.D. Dusheynova, V.K. Krasnitskiy, V.V. Solozhenkin, R.I. Stepanova, I.Ye. Sizov and E.M. Shodro, Kirghiz State Medical Institute]

[Abstract] Extensive medical examinations were performed on 124 workers from a high-temperature turbine plant at a power station in Frunze to assess the

health effects of occupational exposure to high temperatures. The results showed that the high-temperature working conditions had adverse effects on a number of cardiovascular, CNS, dermatologic, and otolaryngological parameters, but that for the most part the changes were reversible when the working situation was improved from the hygienic standpoint. Various forms of cardiovascular pathology were uncovered in 16.8% of subjects, 21% presented with inorganic and organic CNS problems, the incidence of various otolaryngological disorders ranged from 9 to 24%, most of the workers presented with teleangiectasia, while in 51% of the subjects serum levels of sodium were depressed, and in 86.6% serum magnesium was below normal.

12172/13046
CSO: 1840/1051

UDC 612.8:591.3

MORPHOLOGICAL AND FUNCTIONAL CHARACTERISTICS OF EMBRYONAL NEURAL GRAFTS IN
ADULT RAT BRAIN

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA in Russian Vol 72,
No 8, Aug 86 (manuscript received 20 Oct 85) pp 1075-1083

[Article by V.V. Senatorov and G.P. Obukhova, Physiological Department imeni
I.P. Pavlov, Scientific Research Institute of Experimental Medicine, USSR
Academy of Medical Sciences, Leningrad]

[Abstract] Histological and electrophysiological studies were conducted on intracephalic neural implants in adult Wistar rats (200-250 g), using 6-8 mm³ embryonic brain grafts with cortical and subcortical structures. The findings demonstrated that 60 to 150 days after grafting, the implants assumed the morphological appearance characteristic of their original site of origin. The implants demonstrated normal-type background electrical activity, with only a few of the neurons in the implant category (2/21) responding to various external stimuli. The data were interpreted to indicate that the adult brain contains trophic factors identical to those in the embryonic brain, which facilitate realization of the plastic potential of the nervous system. Figures 5; references 20: 4 Russian, 16 Western.

12172/13046
CSO: 1840/795

PEPTIDE MODULATION OF SPONTANEOUS AND INDUCED CATECHOLAMINE RELEASE FROM
INFERIOR MESENTERIC GANGLION IN DOG

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA in Russian Vol 72,
No 8, Aug 86 (manuscript received 10 Nov 85) pp 1084-1090

[Article by V.M. Reprintseva, V.P. Martinovich, V.I. Polikarpova and
L.K. Slobodchikova, Laboratory of General Physiology, Institute of Physiology,
Belorussian SSR Academy of Sciences; Laboratory of Bioorganic Chemistry,
Institute of Bioorganic Chemistry, Belorussian SSR Academy of Sciences, Minsk]

[Abstract] Perfusion preparations of isolated inferior mesenteric ganglia of outbred dogs were employed as a model to assess the effects of several peptide hormones on the release of catecholamines. Oxytocin and vasopressin were without effects on spontaneous release of the catecholamines, but inhibited secretion on electrical stimulation of the lumbar splanchnic or hypogastric nerves, or perfusion with acetylcholine. Melanostatin and bradykinin enhanced secretion, with the effects of the former being particularly marked in the case of epinephrine. Bradykinin did not modify catecholamine release induced by electrical stimulation or acetylcholine perfusion, while melanostatin had a potentiating effect. LH/RH induced catecholamine amine release after a 10 min lag period and either prevented or delayed release after induction by at least 40-50 min. On a preliminary basis, these observations demonstrated an intimate interrelationship between adrenergic system and the peptides in question. Figures 2; references 20: 8 Russian, 12 Western.

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UDC 591.168

STIMULATION OF DNA SYNTHESIS IN CEREBROCORTICAL CELLS OF INTACT AND POST-
HYPOXIC RECIPIENT RATS FOLLOWING EMBRYONAL NEURAL GRAFTING

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 293, No 3, Mar 87 (manuscript received 2 Sep 86) pp 707-711

[Article by L.V. Polezhayev, M.A. Aleksandrova, V.N. Vitvitskiy, L.V. Cherkasova and S.V. Girman, Institute of General Genetics imeni N.I. Vavilov, USSR Academy of Sciences, Moscow]

[Abstract] A study was conducted to determine the effects of a neural graft on DNA synthesis in adjacent recipient tissue, employing both autoradiographic and biochemical methods. Adult female Wistar rats received intracerebral grafts (5-7 mm³) from the brains of 20-day-old Wistar embryos, with the effects on DNA synthesis measured 4 days later. In some cases grafting was conducted into recipients 24 hours after the latter had been subjected to a hypoxic episode. In both the intact and posthypoxic recipients synthesis of DNA was

elevated in the brain sites immediately adjacent to the site of transplantation. The increase was much more pronounced in the intact than the hypoxic rats. Surgical manipulation alone was relatively innocuous. The data indicated that the neural graft was responsible for the secretion of neurotropic factors that stimulated DNA synthesis in the neuroglia, macrophages and endothelial cells of the host, rather than in the neurons per se. Figures 3; references 15: 12 Russian, 3 Western.

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UDC 591.089.84:612

ULTRASTRUCTURE OF EMBRYONAL NEURAL GRAFT IN BRAIN SITES OF POSTHYPOXIC RECIPIENT RATS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 293, No 3, Mar 87 (manuscript received 26 Sep 86) pp 711-713

[Article by L.V. Cherkasova and R.F. Davletchina, Institute of General Genetics imeni N.I. Vavilov, USSR Academy of Sciences, Moscow]

[Abstract] An ultrastructural study was conducted on the grafts derived from embryonic brains of 18-day-old Wistar rats transplanted to brain sites in adult-male Wistar rats that had previously sustained a hypoxic episode. The hypoxic episode had induced extensive dystrophic changes in the cerebrocortical tissue of the recipient rats. However, 100 days after transplantation, the graft demonstrated normal growth and development patterns, and presented with the appearance of normal 3-4-month-old rat neurons. These observations demonstrated the feasibility of grafting embryonal neural tissue into hypoxia-induced dystrophic brain sites, and the subsequent normal development of synaptic connections with the recipient's neurons. Figures 1; references 11: 7 Russian, 4 Western.

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CSO: 1840/631

UDC 612.014.41/45+612.825+612.826

ELECTROPHYSIOLOGICAL STUDY OF RETICULO-LIMBIC INTERRELATIONSHIPS UPON EXPOSURE TO LONG-TERM VIBRATION

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA in Russian Vol 73, No 1, Jan 87 (manuscript received 18 Mar 86) pp 20-27

[Article by S.M. Minasyan and O.G. Baklavadzhyan, Department of Human and Animal Physiology (Headed by O.G. Baklavadzhyan), Yerevan State University]

[Abstract] Long-term exposure to vibration causes nervous system disorders, particularly in the central segments. This article studies the electrical

activity of the dorsal hippocampus, limbic, sensomotor and temporal areas of the cortex and reticulo-cortical evoked potentials of rabbits exposed to vibration. Three months exposure to vibration inhibited the reticulo-cortical interactions, decreasing the summary bioelectrical activity of the cortex and subcortical formations. A mechanism is suggested for development of vibration pathology: Vibration is an adequate stimulus for the mechanoreceptors of the body and the vestibular analyzer. The powerful flux of nervous impulses from the various receptors changes the functional status of the cortex and sub-cortex, disrupting the functioning of the reticular brain stem formations and closely coupled formations of the diencephalic area as well as the hippocampus. Figures 3; references 17: 12 Russian, 5 Western.

6508/13046
CSO: 1840/799

UDC 612.13+577.15/.17

BOMBESIN LOWERS BODY TEMPERATURE PRIMARILY BY INCREASING PERIPHERAL BLOOD FLOW

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA in Russian Vol 73, No 1, Jan 87 (manuscript received 18 Jul 86) pp 111-119

[Article by A.T. Maryanovich, Ye.V. Kudryavtseva, I.V. Gayvoronskiy, O.P. Mikheyev, V.N. Golubev, I.L. Kuranova and S.I. Churkina, Leningrad]

[Abstract] The influence of the tetradecapeptide bombesin on various heat production and liberation processes was studied to determine the main cause of the hypothermic effect of this peptide. Work was performed on 34 male chinchilla rabbits. Bombesin was applied to the lateral cerebral ventricles at 100 μ g per animal. The hypothermia caused by bombesin was shown to be unrelated to any significant changes in contractile thermogenesis. Bombesin caused a 25% decrease in the capability to increase oxygen consumption under cold conditions. Administration of bombesin caused an immediate increase in cross-sectional area of blood vessels in the ear by a factor of 3.5-5. The linear speed of blood circulation also increased. The initial blood vessel diameter was regained after 60 minutes, at which time body temperature stabilization began. Figures 2; references 19: 6 Russian, 13 Western.

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CHANGES IN BLOOD COAGULATING ACTIVITY DURING ACUTE HYPOXIC HYPOXIA

Leningrad FIZIOLOGICHESKIY ZHURNAL SSSR IMENI I.M. SECHENOVA in Russian Vol 73, No 1, Jan 87 (manuscript received 7 Apr 86) pp 130-132

[Article by G.D. Pak, V.S. Sverchkova and T.P. Trandofilova, Laboratory of General Physiology (Headed by S.B. Isabekova), Institute of Physiology, Kazakh SSR Academy of Sciences, Alma-Ata]

[Abstract] Acute oxygen shortage in the inhaled air, causing metabolic acidosis and activation of the sympathetic-adrenal system, results in development of hypercoagulation. This article studies hemocoagulation processes as a function of oxygen tension and acid-base status of the blood in acute hypoxia. Experiments were performed on 49 mongrel dogs under hexenal narcosis inhaling mixtures containing 10-15% O₂ in nitrogen. As hypoxemia increased, the coagulation capacity of the blood also increased. A close correlation was observed between p_aO₂ and silicone plasma time. The relationship between p_aO₂ and kaolin time of rich and poor thrombocytes and between p_aO₂ and contact activation range index were somewhat less clear. In compensated hypoxia, no changes in coagulation potential were observed; however, with manifest hypoxia and decompensation (p_aO₂ < 42 mmHg), hypercoagulation did occur, indicating that there is a critical p_aO₂ level, accompanied by the development of respiratory alkalosis and tissue hypoxia, below which the relative dynamic equilibrium is disrupted in the plasma hemostasis system and hypercoagulation develops. References 13: 9 Russian, 4 Western.

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CSO: 1840/799

VACCINE AND INFANT DISEASES

Moscow MOSKOVSKAYA PRAVDA in Russian 7 Apr 87 p 3

[Article by V. Nikolayev]

[Abstract] Six diseases are life-threatening to infants and yet they are preventable by vaccinations: measles, tetanus, tuberculosis, diphtheria, polio and whooping cough; most of them are rare these days except for measles and whooping cough. Some parents believe that it is not necessary to vaccinate their infants because these diseases are now so rare. However, the success achieved in controlling infectious diseases was due to saturation immunizations. Therefore, the existing regulations on child vaccinations should be supported and not opposed. The few side effects are unavoidable and in special cases special medical attention may be necessary. A schedule of required shots, a "Health Passport for Children" is advocated. Figures 1.

7813/13046

CSO: 1840/696

HUMAN TV IMAGE: PSYCHOSEMANTIC STUDIES

Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 7, No 3, May-Jun 86 pp 62-70

[Article by V.F. Petrenko and Ye.Ye. Pronina, Moscow State University]

[Abstract] Psychosemantic studies were conducted on the problem of interpersonal relations as applied to the interaction of TV newscasters with their audience. Studies and evaluation of the subjective factors and projections demonstrated that perception and acceptance of newscasters and their statements was highly dependent on audience sophistication. The audience was, in turn, influenced by the newscaster's image and evaluated their statements in that light. These are factors that have to be considered in further attempts at improving the ideological and educational role of television in society. References 31: 20 Russian, 11 Western.

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CSO: 1840/1052

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MODELING OF RAT LYMPHOCYTES REACTION TO IRRADIATION

Yerevan BIOLOGICHESKIY ZHURNAL ARMENII in Russian Vol 39, No 11, Nov 86
(manuscript received 20 Nov 85) pp 922-925

[Article by A.A. Ogandzhanyan, Scientific Research Institute of Medical
Radiology, ArSSR Ministry of Health, Yerevan]

[Abstract] Statistical methods based on regression analysis are widely used in studies of "radiation dose--biological effect" problems. However, they are principally correlating only single biological effects in isolation. Yet many concurrent reactions occur in the irradiated systems affecting various life processes of the cells, organs and total systems. Therefore, multi-dimensional models are much more applicable to proper evaluation of the aspects. Rat lymphocytes were studied because they are very radiosensitive cells. Changes in lymphocytes result in damage of many functions of the lymphoid organs. Morphometry was used to evaluate functional activity of these cells. It was shown to be an effective approach to the evaluation of the totality of indices characterizing morphofunctional state of irradiated cells. References 10: 7 Russian (2 by Western authors), 3 Western.

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NUCLEAR WAR IN MOUNTAINOUS AREAS

Frunze ZDRAVOOKHRANENIYE KIRGIZII in Russian No 3, May-Jun 86 pp 3-5

[Article by S.B. Daniyarov and P.N. Goldberg, Kirghiz State Medical Institute]

[Abstract] In many respects a nuclear holocaust in mountainous regions poses considerably greater threat to the environment and human survival than a nuclear war limited to the plains. A single nuclear explosion in a mountain range would result in a compacted shock wave directed in various directions and reflected from range to range with devastating effects due to limited dissipation. Precariously balanced snow caps and rock formations would lead to avalanches of rocks, snow, and water with unimaginable damage, compounded further by channeling of various forms of electromagnetic radiation within

the physical constraints of the environment. It is stated that Soviet physicians are well aware of the danger posed by nuclear warfare and its global consequences and are at the forefront of those fighting for peace and containment of S.D.I. research and development.

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CSO: 1840/1051

ALL-UNION CONFERENCE ON INDUSTRIAL CULTIVATION OF MICROALGAE

Tashkent UZBEKSKIY BIOLOGICHESKIY ZHURNAL in Russian No 4, Jul-Aug 86 pp 65-66

[Article by A. Rakhimov]

[Abstract] The conference, organized by Main Administration of Microbiological Industry, USSR Council of Ministers; TSSR Academy of Sciences; All-Union Scientific Research Biotechnical Institute and Scientific-Production Association "Solntse" [Sun], TSSR Academy of Sciences, was held 17-19 Sep 85 in Ashkhabad. Over 100 papers were presented. The topics discussed included: use of chlorella as a substitute for normal grasses, current biotechnology in production of microbiologicals, production of chlorella using solar energy, biotechnology of photoautotrophic biosynthesis, industrial reactors for production of microalgae, experimental-production plant for chlorella, collection of photosynthesizing monocellular algae cultures, composition of balanced culture media for cultivation of chlorella. Considerable stress was placed on complex wasteless processes of treating microalgae biomass. Use of the byproducts of other industries as a source of carbon was discussed along with application of solar energy thermostabilization of suspensions, drying, etc. It was suggested that biologically active materials produced by microalgae should be explored in cosmetics, drugs, etc.; large-scale production units have to be developed to accelerate this field. Automation and mechanization of the production processes was addressed. Open facilities for production of microalgae may lead to infection of the cultures and lower their yield. For year-round production, these facilities should be converted to greenhouse operations.

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CSO: 1840/680

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